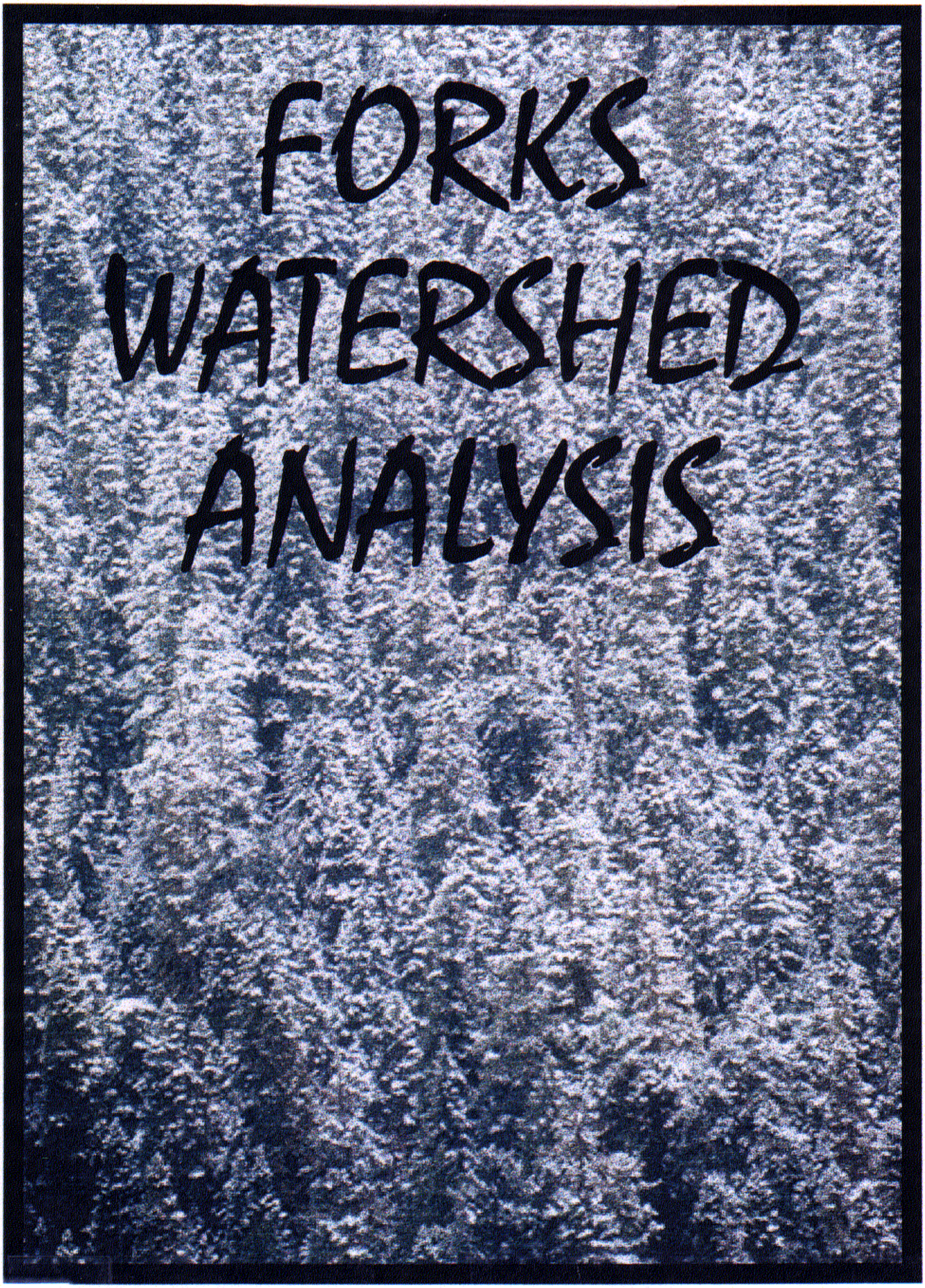
**MIDDLE FORK AND SOUTH FORK**
**OF THE**
**UPPER ROGUE RIVER**




**USDA Forest Service**
**Rogue River National Forest**

**Prospect and Butte Falls Ranger Districts**
**Jackson and Klamath Counties, Oregon**

# MIDDLE FORK AND SOUTH FORK
# OF THE
# UPPER ROGUE RIVER
# WATERSHED ANALYSIS

USDA Forest Service
Rogue River National Forest
Prospect and Butte Falls Ranger Districts
Jackson and Klamath Counties, Oregon

Middle Fork and South Fork
of the
Upper Rogue River

**~FORKS~**
# Watershed Analysis

Jackson and Klamath Counties, Oregon
November 1998

# TABLE OF CONTENTS

## PART I - INTRODUCTION


INTRODUCTION.......... 1
PARTICIPANTS.......... 1
PUBLIC INVOLVEMENT.......... 2
AGENCY INVOLVEMENT.......... 2
LOCATION OF THE FORKS WATERSHED.......... 3
CHARACTERIZATION OF THE FORKS WATERSHED.......... 6
LAND ALLOCATIONS.......... 8
ISSUES AND KEY QUESTIONS.......... 12
- FIRE RISK AND MANAGEMENT.......... 12
- LATE-SUCCESSIONAL VEGETATION.......... 12
- ROAD NETWORK.......... 12
- HABITAT CONNECTIVITY.......... 13
- WILDERNESS USE.......... 13
- WATER QUALITY.......... 13


## PART II - LANDSCAPE HISTORY


PREHISTORY AND NATIVE GROUPS.......... 14
EARLY EURO-AMERICAN USES.......... 15
ROLE OF FIRE.......... 16
AGENTS OF CHANGE.......... 18
INSECTS AND DISEASE.......... 20
CONTROLS.......... 22
SOIL CHACTERISTICS.......... 22
EFFECTS OF PAST MANAGEMENT.......... 24
GEOLOGIC LANDFORMS.......... 26
GEOLOGIC MATERIALS.......... 27
EROSION.......... 27
MASS WASTING.......... 29
MINERAL AND ENERGY RESOURCES.......... 29

## PART III - PRESENT CONDITION


VEGETATIVE STRUCTURE .... 30
SERIES AND PLANT ASSOCIATION .... 33
LANDSCAPE PATTERN .... 34
Seral Stages .... 38
Stand Density .... 40
Plant Communities .... 40
Disturbance .... 40
WILDLIFE HABITAT .... 43
Historical Habitat Conditions .... 43
Current Habitat Conditions .... 48
HABITAT CONNECTIVITY .... 53
WILDLIFE SPECIES IN THE WATERSHED .... 55
Historical Populations .... 55
Current Populations .... 55
AQUATIC SYSTEMS .... 56
Streamflow .... 56
Timing and Distribution of Streamflow .... 56
Climatic Patterns .... 56
Hydrology .... 57
Stream Network/Pattern .... 59
Lakes .... 60
Land-use Changes and Channel Modifications .... 60
Snowmelt Re-Direction and Concentration .... 61
Surface flow Production .... 63
Other Land-Use Changes and Channel Modifications .... 65
Fisheries and Aquatic Species .... 65
WATER QUALITY .... 66
HUMAN USES .... 68
Livestock Grazing .... 68
Recreation Use .... 70
Timber Harvesting and Roads .... 71


## PART IV - FINDINGS & RECOMMENDATIONS


FINDINGS AND RECOMMENDATIONS .... 75
FIRE RISK AND MANAGEMENT .... 75
LATE-SUCCESSIONAL VEGETATION .... 76
ROAD NETWORK .... 77
POTENTIAL FOR ADVERSE WATERSHED CUMULATIVE EFFECTS .... 80
HABITAT CONNECTIVITY .... 83
WILDERNESS USE .... 84
WATER QUALITY .... 84
FLOW REGIME .... 84
WATERSHED CONDITION RATING .... 85
INFLUENCES TO WATER QUALITY .... 86
Stream Flow Regime .... 87
Water Quality .... 87
Riparian Reserves .... 87
MONITORING .... 89

# LIST OF MAPS

MAP 1 Oregon Vicinity Map.......... 3

MAP 2 Subwatersheds and Streams.......... 4

MAP 3 Forest Vicinity Map.......... 5

MAP 4 Color Relief Map.......... 7

MAP 5 Ownership.......... 9

MAP 6 Federal Land Allocations.......... 10

MAP 7 Fire Occurrence.......... 17

MAP 8 Fuel Models.......... 19

MAP 9 Slope Class.......... 23

MAP 10 Soil Stability.......... 25

MAP 11 Geologic Rock Types.......... 28

MAP 12 Species Groups.......... 32

MAP 13 Plant Series.......... 35

MAP 14 1948- 49 Historical Vegetation.......... 36

MAP 15 Current Vegetation - 1994 Satellite Imagery.......... 37

MAP 16 Seral Stages.......... 41

MAP 17 Historical Habitat Types.......... 47

MAP 18 Current Habitat Types.......... 51

MAP 19 Condition Classes.......... 54

MAP 20 Transient Snow Zone.......... 58

MAP 21 Drainage-way Crossings.......... 62

MAP 22 Fish Bearing and Non-Fish Bearing Streams.......... 67

MAP 23 Range Allotment Areas.......... 69

MAP 24 Past Harvest Areas.......... 72

MAP 25 Road Density by Subwatershed.......... 74

MAP 26 Hydrologic Recovery by Subwatershed.......... 79

MAP 27 LSR Network - S. Oregon/N. California.......... 81

## LIST OF FIGURES

Figure 1. Arrangement of Vegetation Zones in the Southwestern Oregon Cascade Range........30

Figure 2. 1948 and 1997 Vegetation Comparison........38

## LIST OF TABLES

Table 1. Management Responsibility or Ownership of Lands in the Forks Watershed..... 8

Table 2. Forest Service Land Management Allocations Within Forks Watershed........ 8

Table 3. Comparison of Habitat Conditions in the Forks Watershed........39

Table 4. Summary of Dead Woody Material, by Plant Series........42

Table 5. Historical Condition of Terrestrial Habitat........44

Table 6. Historical and Current Suitable Spotted Owl Habitat........45

Table 7. Great Gray Owl Habitat........45

Table 8. Current Condition of Terrestrial Habitat........48

Table 9a. Habitat Condition for Red Tree Vole........50

Table 9b. Red Tree Vole Habitat Availability........50

Table 10. Forks Watershed Big Game Habitat........52

Table 11. Percent of Dominant Precipitation Patterns by Sixth Field Watershed........59

Table 12. Drainage-ways Crossed in Stream Segments by Sixth Field Watershed........63

Table 13. Expected Relationship Between Road Position and Mechanism for Road Effects on Flow........64

Table 14. Percent of Roads by Hillslope Position Within Each Sixth Filed Watershed........64

Table 15. Condition Rating Based on Percent of Sixth Field Watershed with Vegetated Stands Less Than 30 Years Old........78

Table 16. General Watershed Condition Based on Road Densities Relative to Watershed Slope........78

Table 17. Forks Watershed Sixth Field Condition Based on Road Densities Relative to Watershed Slope........80

Table 16. Current Watershed Condition........86

# CONTENTS OF APPENDICES

APPENDIX A - Public Involvement

APPENDIX B - Environmental History of the Forks Watershed

APPENDIX C - Fire and Fuels Report - Forks Watershed

APPENDIX D - Middle Fork/South Fork Rogue - Insect and Disease Conditions

APPENDIX E - Soils - Forks watershed Analysis

APPENDIX F - Geology Report - Forks Watershed

APPENDIX G - Forks Watershed Terrestrial Wildlife Assessment

APPENDIX H - Fisheries

APPENDIX I - Hydrology - Aquatic Systems

APPENDIX J - Recreation Input - Forks Watershed

# PART I
# INTRODUCTION

# Middle Fork and South Fork of the Upper Rogue River Watershed Analysis

**Rogue River Basin**
**Upper Rogue Subbasin**

**Jackson and Klamath Counties, Oregon**
**November 1998**

## INTRODUCTION

The Middle Fork and the South Fork of the Upper Rogue River Watershed Analysis is an assessment of the current health and condition of the terrestrial and aquatic ecosystems. Its objective is to characterize the dominate elements of this landscape and identify the control points for measuring the cumulative effects of natural processes and management activities. This report documents the analysis completed by an interdisciplinary team and displays major findings on the current watershed conditions and future trends. It also includes recommendations for maintaining and restoring ecosystem conditions through management activities and restraints.

The Middle Fork and South Fork of the Upper Rogue River Watershed Analysis, also known as the "Forks Watershed Analysis", is an attempt at linking the broad based Land and Resource Management Plan of the Rogue River National Forest, as amended by the Northwest Forest Plan, with the effects of past, present and future activities analyzed at the project scale. This interdisciplinary team relied on existing information and data in presenting and evaluating the current condition.

There are no actions to be implemented with this analysis and therefore no decisions are made under this document. This document provides direction to initiate site specific analysis for projects related to landscape management. Watershed Analysis is an iterative process that allows for new information and recommendations to be added or changed at any time in the future.

This analysis was done in support of the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* and incorporates the Aquatic Conservation Strategy objectives. The Forks Watershed is not within a Tier 1 or 2 Key Watershed.

## PARTICIPANTS

The Forks Watershed Analysis was conducted by a Rogue River National Forest interdisciplinary team. The team used the *Federal Guide for Watershed Analysis*, version 2.2, 1995, as a guide to the analysis process for this area. This Watershed Analysis addresses public and private lands within the watershed boundary to the extent possible. Management recommendations apply only to lands managed by the Rogue River National Forest.

This analysis was conducted by the following Forest Service managers and resource specialists:

| | |
|---|---|
| **District Rangers:** | Bob Wilcox and Carlos Carrillo |
| **Team Leader:** | Mark Martin - Integrated Resource Planner |
| **Team Members:** | George Badura - Soils Scientist<br>Dave Bowen - Road Engineer<br>Werner Bruckner - Silviculturist<br>Pete Jones - Geologist<br>Jack Sizemore - Fire/Fuels Specialist<br>Fred Wahl - Wildlife Biologist<br>Debbie Whitall - Hydrologist |
| **Support to Team:** | Jon Brazier - Hydrologist<br>Chris Dent - Recreation Planner<br>Ellen Goheen - Insect and Disease Specialist<br>Frank Lake - Fisheries Biologist<br>Jeff LaLande - Archeologist/Historian<br>Carol Boyd - Geographic Information Systems<br>Ken Grigsby - Editor |

## PUBLIC INVOLVEMENT

Public involvement associated with this process included a letter to the public to explain the Watershed Analysis process, what would be expected as a result of this analysis and how they could be involved in this analysis. The Project Planning/NEPA mailing list for the Cascade Zone was used as the mailing list source. Letters were sent to land owners in or near the analysis area and to individuals or groups that have been participants in project planning in the past.

No comments specific to the Forks Watershed Analysis were received. Two individuals did request copies of the completed document.

## AGENCY INVOLVEMENT

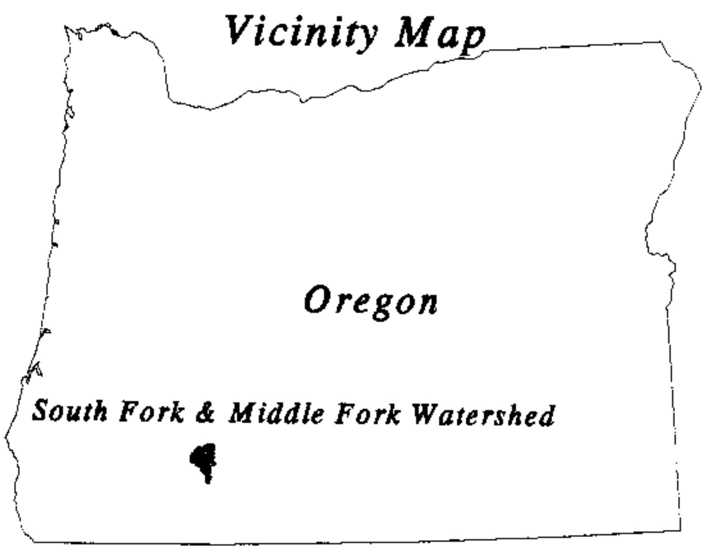
Contact was made with the Medford District, Bureau of Land Management office to discuss this analysis and confirm the analysis area boundary. A decision was made at that time to use a watershed boundary that split the 5th field watershed dividing BLM managed land from Forest Service managed land. Although this is not the true 5th field watershed boundary, an adjacent BLM analysis was already underway and was designed to address specific watershed issues in their area.

The entire 5th field watershed will therefore be covered by analysis with the completion of both documents; the Lost Creek Watershed Analysis (BLM) and the Forks Watershed Analysis (FS). This document will not address resources or activities in the BLM's Lost Creek Analysis area.

Crater Lake National Park was contacted about this analysis. A small portion of the Park's southwest corner is included in the watershed analysis area. No information was exchanged. Descriptions of the resources and land within the Park are based on Forest Service interpretations. The same can be said for private lands within the watershed analysis boundary.

## LOCATION OF THE FORKS WATERSHED

The Forks Watershed is located along the eastern boundary of the Rogue River National Forest, about 40 miles northeast of the city of Medford. The watershed analysis area is on the western slope of the Cascade Mountain Range, between Crater Lake to the north, and Mt. McLoughlin to the south. This 136,181 acre watershed is located in Jackson and Klamath Counties, Oregon; see Vicinity Map 1.




**MAP 1**

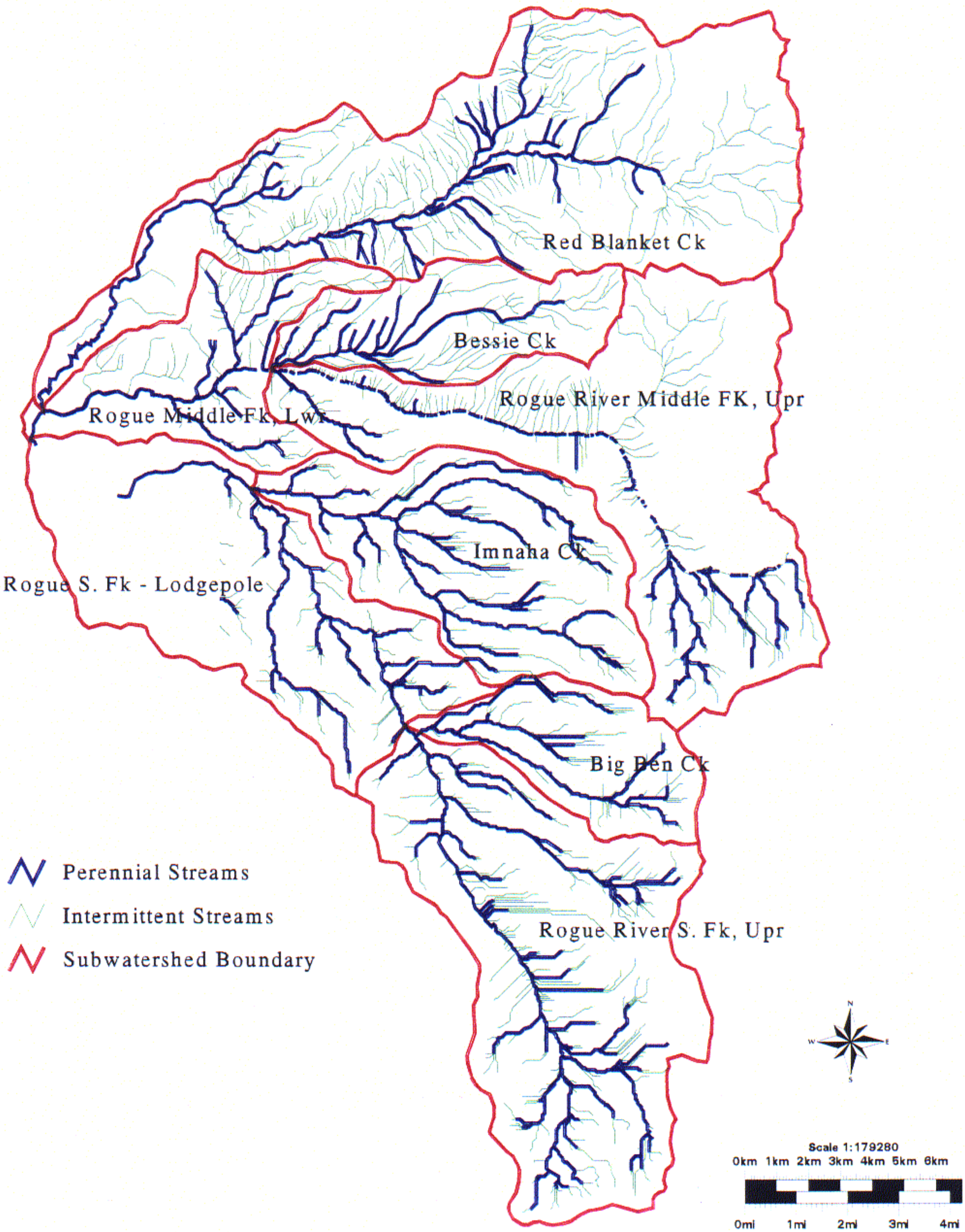
The Forks Watershed is divided into 8 subwatershed areas that separate the drainages of Red Blanket Creek, Bessie Creek, Lower & Upper Sections of the Middle Fork of the Rogue, Imnaha Creek, Lodgepole Creek, Big Ben Creek and the Upper Section of the South Fork of the Rogue; see Map 2.

The Middle Fork of the Rogue River flows west from its sources in the Seven Lakes Basin of the Sky Lakes Wilderness Area. The South Fork of the Rogue River flows north, then west from its source in the Blue Canyon area, also in the Sky Lakes Wilderness. The Middle Fork and South Fork flow together and join with the Rogue River just above Lost Creek Lake. On the broader scale, the watershed is located in the Upper Rogue River Subbasin of the Rogue River Basin; see Vicinity Map 3.

# South Fork & Middle Fork Watershed

MAP 2

## Subwatersheds and Streams



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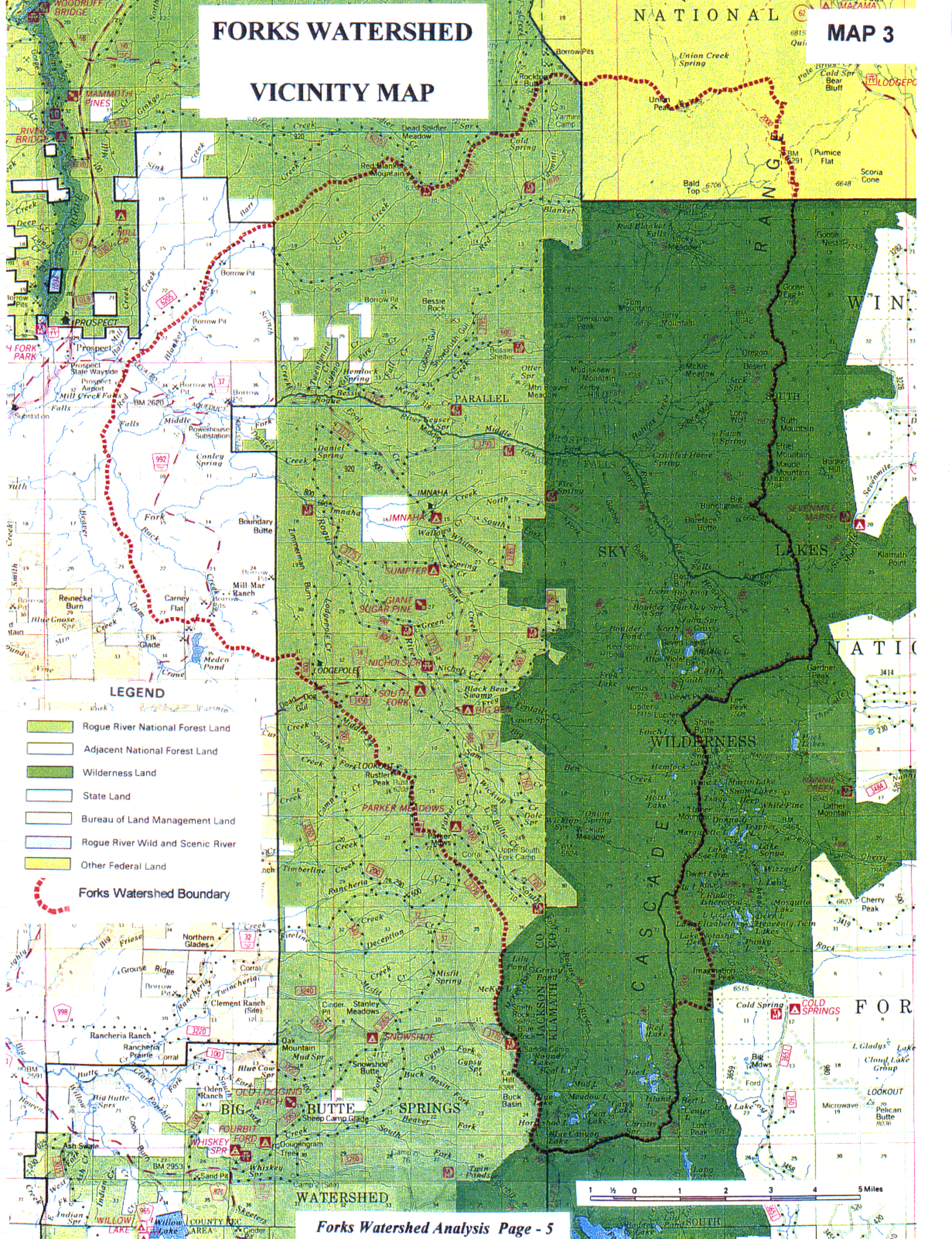
FORKS WATERSHED
VICINITY MAP
MAP 3
LEGEND
Rogue River National Forest Land
Adjacent National Forest Land
Wilderness Land
State Land
Bureau of Land Management Land
Rogue River Wild and Scenic River
Other Federal Land
Forks Watershed Boundary
NATIONAL
SKY LAKES
WILDERNESS
CASCADE
BIG BUTTE SPRINGS
WATERSHED
PARALLEL
PROSPECT
IMNAHA
SUMPTER
GIANT SUGAR PINE
NICHOLS GAP
LODGEPOLE
SOUTH FORK
PARKER MEADOWS
SNOWSHOE
BIG BEN
COLD SPRINGS
SEVENMILE MARSH
MAMMOTH PINES
RIVER BRIDGE
5 Miles

## CHARACTERIZATION OF THE FORKS WATERSHED

The topography in the Forks Watershed is typical for the west slope of the Cascade Mountains. The elevation in the watershed ranges from about 2500 feet, to over 7500 feet above sea level. The crest of the Cascades through the Sky Lakes Wilderness forms the dominate east boundary for the watershed. This high elevation area consists of numerous, young volcanic peaks and their associated flows. Extensive alpine glaciation of the most recent ice age has created the dramatic sculpting of the wilderness peaks. The craggy peaks, cirque basins and lakes of the highlands give way to long sweeping glacially carved U-shaped canyons in the middle elevation range. Today, these are identified as Red Blanket, Middle Fork and South Fork Canyons. Away from the canyons, the terrain is relatively gentle and rolling. See Map 4 for topographic relief features. The climate is characterized by cool moist winters and warm dry summers. Precipitation ranges between 45 and 65 inches annually. Most occurs from October through March and comes in the form of snow in the higher elevations and rain in the lower elevations.

Landscape features that characterize the Forks Watershed include:

- Sky Lakes Wilderness and a portion of Crater Lake National Park with a typical high cascades character displaying jagged volcanic peaks and pure mountain lakes found in glacially carved basins.
- Developed and dispersed camping areas and trailheads that access the Sky Lakes Wilderness.
- Major sources of cold, clean water. Several lakes in the Wilderness are considered the purest in the west.
- National Forest land that serves as connective habitat to plants and animals.
- A high density road system outside the Wilderness that provides access to nearly all parts of the watershed.
- Cold, clear streams with relatively few fish or other aquatic organisms.
- Prospect Powerhouse and diversion dam located on the South Fork of the Rogue.
- Private land that has been extensively managed for timber, cattle and agricultural production.
- Mixed conifer forests dominated by Douglas-fir and white fir at middle elevations, and Shasta red fir and mountain hemlock at higher elevations.

# South Fork & Middle Fork Watershed

MAP 4

## Color Relief Map




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The Forks Watershed is primarily located within Jackson County, Oregon. Portions of the eastern boundary of the watershed are located in Klamath County, Oregon. The majority of the watershed is managed by the USDA, Forest Service, the northeast corner is National Park land administered by the USDI, National Park Service and the western portion is private land. Several parcels of privately owned land are located within the National Forest boundary. Map 5 portrays the management/ownership distribution within the watershed and Table 1 displays the management/ownership and area.

**Table 1. Management Responsibility or Ownership of Lands in the Forks Watershed.**

| OWNERSHIP | | ACRES | PERCENT |
|---|---|---|---|
| National Forest | | 111,171 | 82 |
| National Park | | 6,951 | 5 |
| Private | | 18,059 | 13 |
| | **Total** | **136,181** | **100** |

## LAND ALLOCATIONS

Map 6 shows the distribution of land allocations in the Forks Watershed. This management direction comes from the Rogue River National Forest Land and Resource Management Plan as amended by the Northwest Forest Plan. It shows the most restrictive allocation with regard to management activities. It should be noted that the merging of the Rogue River Forest Plan with the Northwest Forest Plan is still in progress. Minor changes should be expected as the merging of the allocations are finalized through on-the-ground verification of areas such as Riparian Reserves. Table 2 shows the approximate area within each management allocation for Forest Service managed lands.

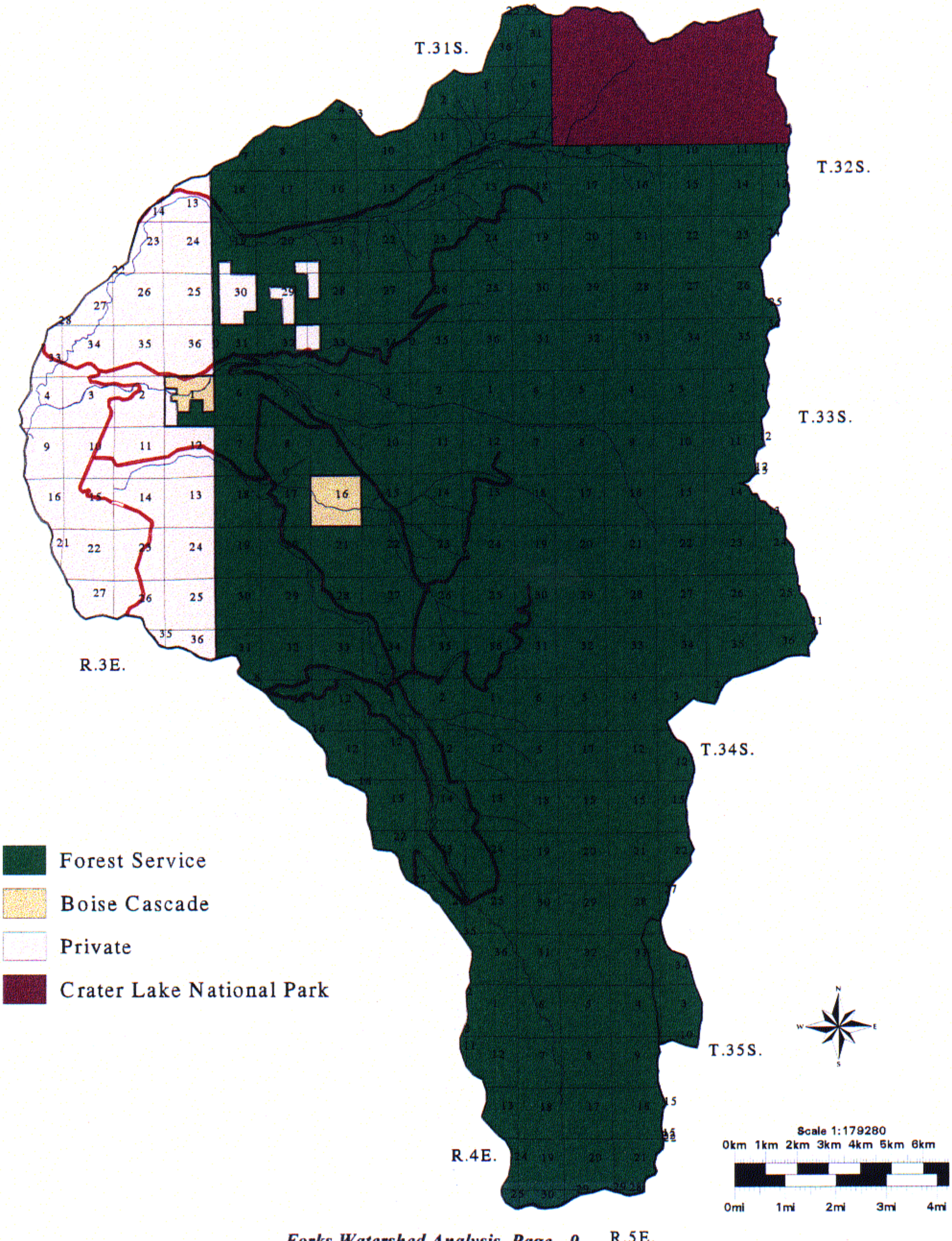
**Table 2. Forest Service Land Management Allocations Within Forks Watershed.**

| Management Allocation | Acres |
|---|---|
| Developed Recreation | 282 |
| Foreground Retention - Matrix | 7 |
| Wilderness | 59,163 |
| Big Game Winter Range - Matrix | 3,275 |
| Timber Suitable I - Matrix | 1,295 |
| Managed Watershed - Matrix | 3 |
| Riparian Reserve | 16,705 |
| Late-Successional Reserve | 30,441 |
| **Forest Service Total** | **111,171** |

# South Fork & Middle Fork Watershed

**MAP 5**

## Ownership



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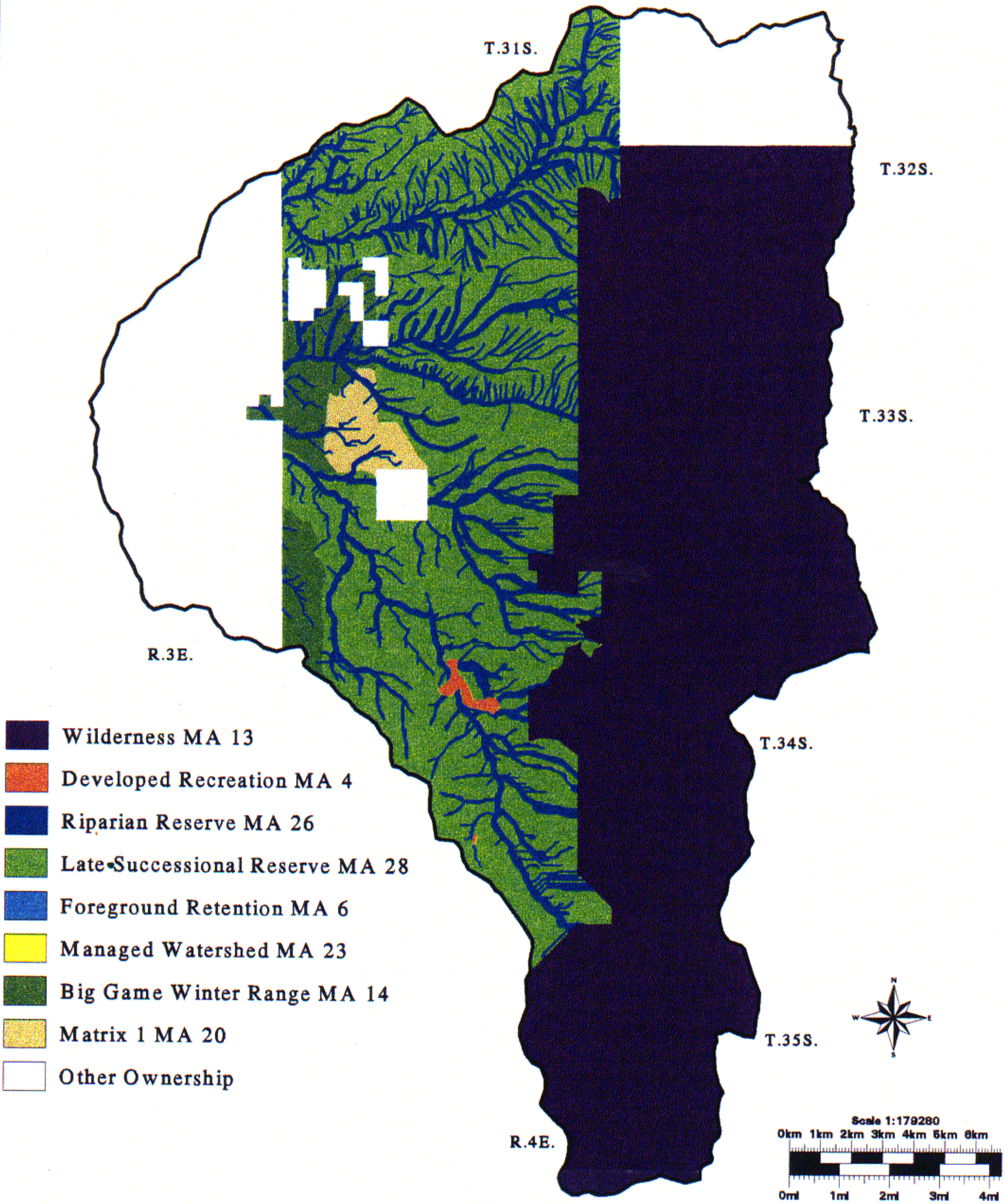
# South Fork & Middle Fork Watershed

MAP 6

## Federal Land Allocations



The following discussion relates to the management allocations as applied by the Northwest Forest Plan.

Congressionally Reserved Areas: This area includes the Sky Lakes Wilderness Area and Crater Lake National Park. Management of these lands follows direction in their applicable plans. Approximately 66,114 total acres are allocated to Congressionally Reserved Areas in the watershed.

Late-Successional Reserve: Approximately 30,441 acres of Forest Service land within the Forks Watershed are designated as Late-Successional Reserve (LSR). Late-Successional Reserves are intended to serve as habitat for late-successional related species, with natural process allowed to function to the extent possible. The goal for this landscape pattern and structure is a relatively unfragmented mature forest that attempts to duplicate existing old-growth forests by managing for multi-species, multi-layers, coarse wood and trees in various stages of rot and decay. Management activities that accelerate the development of late-successional conditions are allowed.

An LSR Assessment for this area, another requirement of the Northwest Forest Plan, has been completed ( April 1998). It is part of a much broader landscape assessment of the Southwest Cascades. This assessment provide recommendations at a broad scale for management that focuses on promoting late-successional characteristics. Site specific activities will still require detailed analysis on a case-by-case basis.

Riparian Reserves: Riparian Reserves apply to federally managed lands and generally parallel stream networks. They are buffers for streams, wetlands and unstable terrain. Their purpose is to protect aquatic systems and provide for greater connectivity in the watershed. Generally, the goal is to maintain a mature forest structure with an emphasis on the species that use or contribute to late-successional conditions. Riparian Reserve buffer widths vary by stream type and fish bearing status. There are approximately 16,705 acres of federal Riparian Reserve area within the Forks Watershed.

Administratively Withdrawn Areas: These areas are identified in the Rogue River National Forest Plan as Developed Recreation and certain backcountry allocations. They are not scheduled for timber harvest. In the Forks Watershed area, there are 282 acres of the Developed Recreation management allocation. This encompasses the four developed campgrounds that are within the watershed.

Matrix: The Matrix is the federally managed land outside all other allocations of the Northwest Forest Plan. This is the area where regulated timber harvest occurs and it may contain non-forested and unsuitable timber production ground. In the Forks Watershed, the Matrix includes approximately 4,580 acres of National Forest Land. The Rogue River Forest Plan further defines Matrix in the watershed to include the Foreground Retention, Big Game Winter Range, Timber Suitable I, and Managed Watershed management allocations. Refer to the Rogue River National Forest Land and Resource Management Plan for more information on these management allocations.

## ISSUES AND KEY QUESTIONS

This section presents the key elements of the Middle Fork and South Fork of the Rogue River Watershed ecosystem. These elements are presented in the form of issue areas and key questions that represent the most relevant points of current human values, present resource conditions and future management opportunities. These elements were identified by the interdisciplinary team and reviewed by the line officers (District Rangers). This list of issue areas and key questions are addressed in this analysis as well as the core questions identified in the federal watershed guide.

The issue areas were used as a way to narrow the focus of this analysis. These issues were identified as being the most critical or influential to the watershed. The order for issue areas and key questions does not imply importance.

### FIRE RISK AND MANAGEMENT

- What is the current risk of large scale (1000 acres or greater) wildfire in the watershed?
- What role has fire played in the watershed?
- What effect do late-successional objectives in the LSR have on fire risk?
- What would be the effect of using fire as a tool in the future management of this watershed?

### LATE-SUCCESSIONAL VEGETATION

- What is the current status of the vegetative conditions in the watershed?
- What is the potential to develop and sustain the conditions necessary for late-successional and old-growth ecosystems in the watershed?
- What role does late-successional vegetation play in the connection of habitats across the landscape of this watershed?

### ROAD NETWORK

- What is the current road network in the watershed?
- What effect does slope have on system road location?
- What is the effect of road/stream crossings by stream type?
- What effect do roads have on stream dynamics?
- What effect does the road system have on the potential for increased flow rates?
- Given the system road density and the current vegetative condition, what is the relative risk for adverse cumulative watershed effects in the watershed?

## HABITAT CONNECTIVITY

- What is the current status of terrestrial and aquatic species and their habitats in the watershed?
- What role does the vegetation play in the distribution of species and the connection of habitats across the landscape of this watershed?

## WILDERNESS USE

- What is the current condition of the Sky Lakes Wilderness?
- How has human use, past and present, influenced the current condition of the Wilderness?
- What is our ability to promote a fully functioning ecosystem while maintaining a quality and safe experience for wilderness users in the future?
- What effects will prescribed natural fire have on the Wilderness?
- How does range uses (grazing) affect the Wilderness?

## WATER QUALITY

- What is the current status of water quality in the watershed?
- What elements of the ecosystem influence or have the ability to change the water quality of the mountain lakes and streams?

# PART II
# LANDSCAPE HISTORY

## PREHISTORY AND NATIVE GROUPS

The area of the Middle Fork and South Fork of the Rogue River Watershed has been used, relatively lightly by human beings for several thousand years. Although the area is considered to contain gentle, rolling terrain, the "deep forest" character may have contributed to the lack of early human activity.

The first human beings in southwestern Oregon were people archeologists call "paleo-indians." They probably arrived at the close of the Ice Age about 11,000 years ago. The Paleo-indians very likely would have hunted within the Forks Watershed Area. Although very few sites in southwestern Oregon have yielded Paleo-indian artifacts, one known site is located in the Forks Watershed Area, near Medco Ponds. Overall, a recent and extensive archeological survey suggests that prehistoric human presence was light in comparison to nearby watersheds. Archeological sites documented within the Forks Watershed Area probably represent recurrent but short term occupation by small groups of hunter/gatherers.

It is probable that the Forks Watershed area was typically visited by only a few, small, widely dispersed groups during a given year. Arboriginal travel routes through the area likely followed drainage divides rather than canyon bottoms. A few routes probably provided regular trans-Cascadian access.

Small populations of native trout, as well as limited runs of salmon and steelhead in the lower sections of the rivers may have provided food to some native anglers. However, fishing likely was never very important within the watershed, especially in comparison to the sizable anadromous fishery of the main stem of the Rogue River below Prospect.

Hunting by the Klamath people and their ancestors of previous centuries, probably focused on deer and elk in the area. The gathering of edible plants certainly took place within the watershed. Sugar pine nuts, chinkapin nuts, hazel nuts, service berries and huckleberries were all available as widely dispersed resources.

Spiritual uses of the watershed would have included visits by Klamath youths and shamans to prominent high points and mountain lakes for solitary power quests.

During the late prehistoric and early historic times, the Middle Fork and South Fork Watershed would have been included within the overlapping resource-gathering territories of the upland Takelma, the southern Molalla and the Klamath peoples. Following the defeat and removal of the Rogue River native groups by Euro-American settlers in 1856, the Klamath briefly became the sole native users of the area. This traditional use ended with the Klamath's "confinement" to the Klamath Reservation in 1863. Most traditional native uses of the watershed effectively ended at that time.

## EARLY EURO-AMERICAN USES

Given the remoteness of the watershed from major travel routes, it may be that the first Euro-Americans to actually explore this area did not arrive until the mid-1850's at the earliest. Farmers settling on Donation Land Claims in the Rogue Valley during the early 1850's began grazing their livestock during the summers on the high elevation ranges of the southern Cascades. Some herds of cattle and sheep undoubtedly were grazed in the available meadows of the Forks Watershed area.

During the late 1800's, small scale agriculturalists began to homestead the more remote locations of the Upper Rogue drainage. These families grazed small herds of stock, cut sugar pine shakes and grew small vegetable gardens in a subsistence lifestyle. Some of these people would have hunted game and picked huckleberries in the Forks Watershed area. Very few, if any, mountain ranchers actually settled within the watershed boundaries. Other than the making of sugar pine shakes, the timber resources within the watershed remained relatively untouched during this period. The single most significant exception were the large fires set to improve grazing forage for cattle and sheep.

The decades following 1900 brought steadily increasing, but still quite limited, use of the resources in the Forks Watershed. The establishment of Crater Lake National Park in 1902 and the Crater National Forest (later the Rogue River National Forest) in 1906 brought Federal management to the area. The focus for Forest Service Rangers was to build trails and fight forest fires.

The Watershed's timber resources, although recognized to be of potential economic value, were located too far from the nearest railroad access points to warrant commercial logging during this period. Thus, while the woods to the south of the Middle Fork/South Fork area echoed to the whistle of Owen-Oregon/Medco steam locomotives during the 1920's and 30's, the timber in the Forks Watershed simply "grew larger."

As for mining, no valuable mineral resources were located within the Forks Watershed due to the "economically valueless" volcanic deposits of the area.

The value of the Middle Fork and South Fork rivers, for hydroelectric generation and irrigation, led to water development during the 1930's. The California-Oregon Power Company (COPCO) built small dams across the rivers, diverting water to supply its power generation facility on the main stem of the Rogue River. These developments eliminated the few anadromous fish from the watershed.

The high demand for lumber during World War II ushered in the logging era for the Forks Watershed. Initially, timber harvest was confined to private lands in the lower elevations. National Forest timber began to be harvested in the late 1940's. Selective logging of large diameter sugar pine and Douglas-fir in the South Fork drainage took place during the lumber boom years of the 1950's.

Also during that decade, the Forest Service built or extended roads into Red Blanket Canyon, Bessie Creek drainage, on the slopes of Rustler Peak, into the headwaters of the Imnaha Creek drainage and across the lower Middle Fork Canyon. Over the course of the 1960's and 70's, the current Forest Service road system was all but completed and lined with extensive timber harvest units.

Simultaneous to the impacts of large scale timber harvest, the long developing effects of decades of fire suppression has led to substantial changes in forest structure and species mix. The replanting of timber harvest units with single or a few desirable conifer species has also contributed to compositional changes of the historic vegetation types.

Even with the widespread roading and logging from the 1940's through the 1980's, many lower elevation sections of the watershed retain their dense forest condition. In 1994, much of the Middle Fork/South Fork drainage was designated as a "Late-Successional Reserve", excluding the Sky Lakes Wilderness and Crater Lake National Park, under the Northwest Forest Plan.

## ROLE OF FIRE

Prior to Euro-American settlement, it is almost certain that the forest of the Middle Fork and the South Fork Watershed were subject to repeated fires. This was the determining factor in the appearance of the landscape. The origin of most fires was probably lightning, although the native's use of fire for vegetation and wildlife management purposes indeed affected portions of the watershed. But, given the area's relatively high elevation and the apparent scarcity of low elevation communities such as grassy savannahs and oak/pine parklands, during these centuries it seemed likely that natural fire was far more important, on an acreage basis, than human caused fire. Natural fire, including the infrequent stand replacing fires, in the mid to high elevation forest would have been the dominant force in the upper reaches of the Forks Watershed.

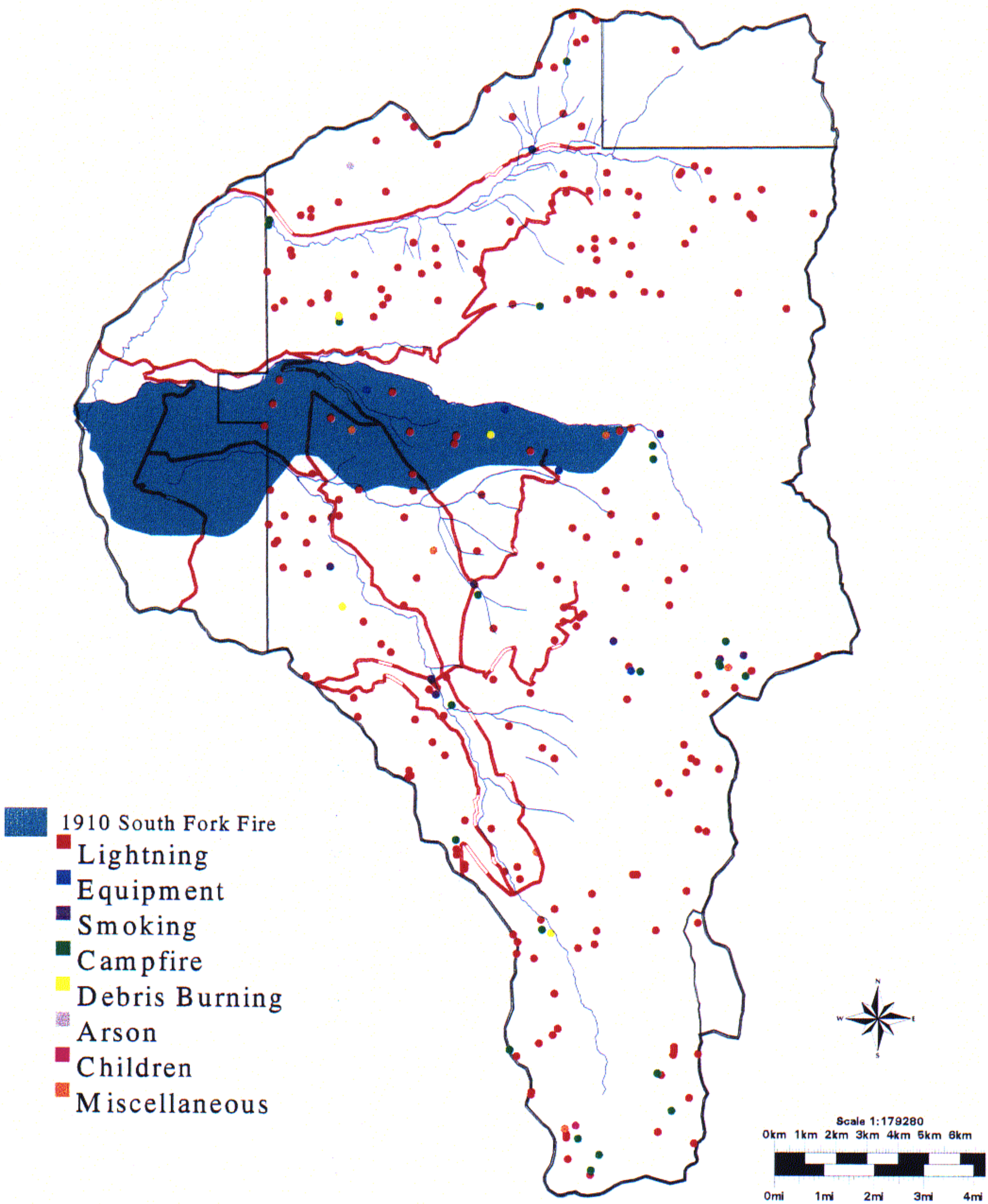
Beginning in the early 1900's, organized fire suppression would play a major role in creating the present landscape. Fire suppression has resulted in the unchecked accumulation of brush and other debris, not to mention the stand conversion to less fire resistant species.

The historical fire regime of the watershed varies from frequent, light surface fires (1 -25 year interval) to long return interval crown/severe surface fire (100-300 year interval). The frequent, light surface fires occurred at lower elevations where summer drying allowed fires to creep through needles and low brush of the open stands of ponderosa pine, sugar pine and Douglas-fir. The long return interval fires occurred at the higher elevations where climatic conditions coupled with additional fuel build-up created fires that were of stand replacement magnitude. Many of these areas exist as brush fields or young, second growth stands today. See Map 7 for fire occurrence and fire history locations.

# South Fork & Middle Fork Watershed

**MAP 7**

## Fire Occurrence



The fire regime for the Forks Watershed is derived using the vegetative condition class map cross referenced with the Northern Forest Fire Lab Fuel Model. This model is part of the BEHAVE Fire Protection and Fuel Modeling System. See Map 8 for the fuel model location as it relates to fire risk.

There are three major fuel models present in the Forks Watershed. The largest model, fuel model 8, occurs in the closed canopy timber stands that includes the short needled, mixed conifer and hardwood stands. Fire burning through this type of stand are generally slow burning ground fires with short flame lengths and the occasional "jackpot" of heavy fuels and flare-ups. Only under severe weather conditions involving low humidities, high temperatures and strong winds does this fuel model burn with high intensity. The majority of land in fuel model 8 is the result of previous harvest entries with aggressive slash treatment. There are approximately 87,000 acres of fuel model 8 in the watershed.

The next fuel model present in the watershed, fuel model 10, has the most potential for producing large fires. This area is characterized by large amounts of down material such as tree tops, limbs and whole trees resulting from mortality or catastrophic events such as the snowdown/blowdown event of the 95-96 winter. There is the potential for large, stand replacing fires on the steep slopes of Red Blanket, Middle Fork and South Fork Canyons, all fuel model 10 areas.

The third fuel model in the watershed is fuel model 11. This condition exists where timber stands contain light slash. Fire in this area can be very active as fine needles and branches provide ample fuel to enhance activity and spread. Aggressive fuel treatment in treated stands of the watershed have kept the area in this fuel condition relatively small. There are approximately 3,200 acres of fuel model 11 in the watershed.

## AGENTS OF CHANGE

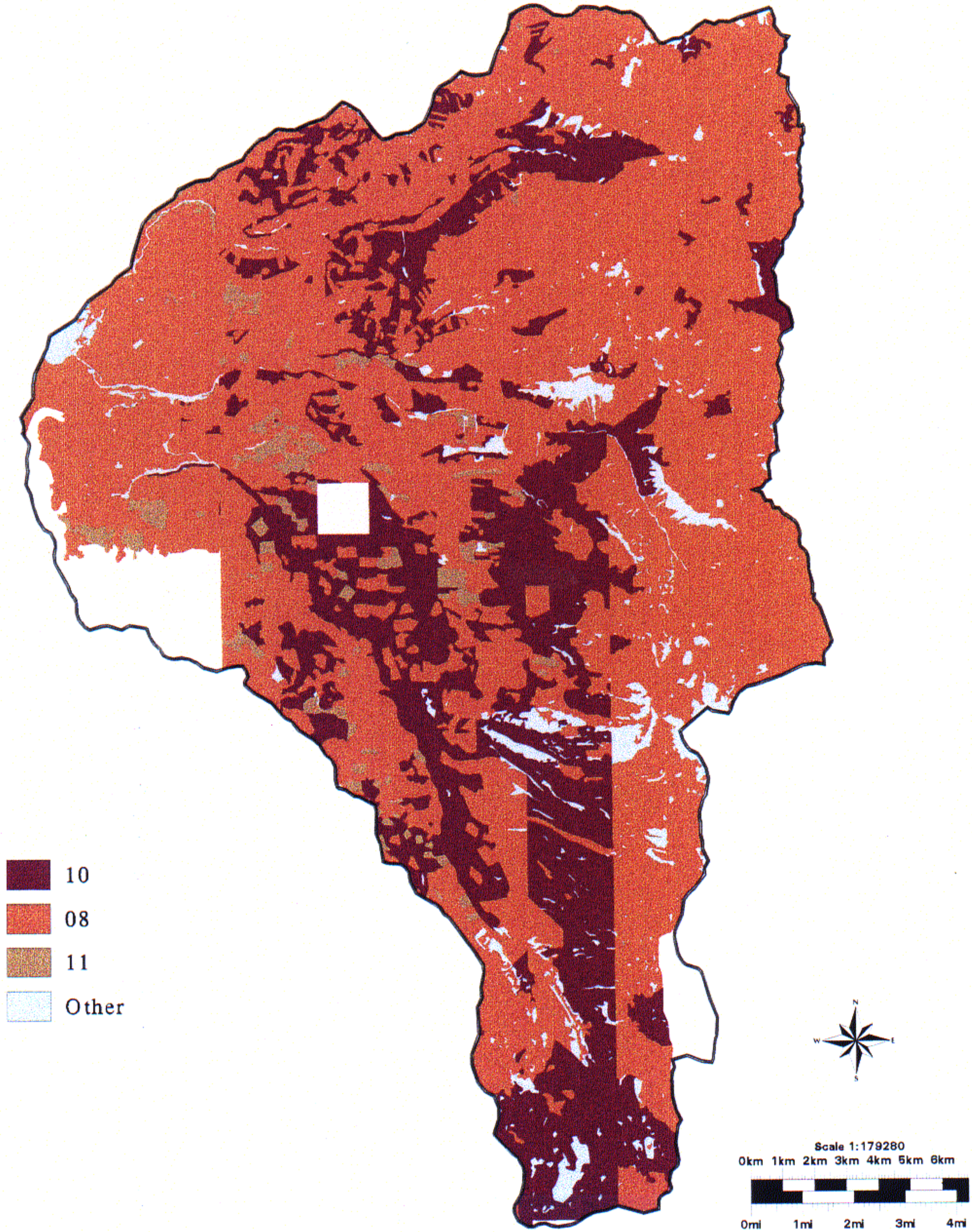
Fire has had a major role in shaping the vegetation patterns in the watershed. Historical fire return intervals range from 11 to 126 years. The entire watershed has burned at some time in the past. Southwest Oregon ecology plots show that over 90% of the plots have evidence of past fires. This evidence makes fire the most dominant agent of change both in frequency and area covered. Historical fires ranged from small spots to large acreage fires that resulted in a mosaic of vegetative patterns.

The fire generated landscape is evident in the vegetative mapping from the 1947-49 county vegetation maps. Although these maps recorded stand conditions 40 years after the beginning of organized fire suppression, it is an adequate example of the historical, natural landscape conditions in the watershed. Up until this time, the watershed remained relatively unaffected by resource management. Approximately 74% of the watershed exhibited stand conditions that contained characteristics of old-growth/late-successional forests. The landscape was largely unfragmented, although the stands were much more open and contained mostly large trees but very little structure.

MAP 8

# South Fork & Middle Fork Watershed

## Fuel Models



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The watershed currently contains a more fragmented condition that includes mostly late seral species. Since the instigation of wildfire suppression, the ingrowth of shade tolerant species has increased stand densities above what is considered to be appropriate for a healthy forest ecosystem. Intensive timber management and fire exclusion has allowed white fir and Douglas-fir to develop dense understories over significant portions of the watershed. The resulting dense tree stocking levels is taxing the ecosystem's resources making competition between trees intense. This condition has predisposed the area to disease and insect attack, a situation aggravated by the recent drought. Trees killed by insects and disease are adding to the fuel loads and the risk of catastrophic fire is high to extreme in many parts of the watershed.

## INSECTS AND DISEASE

Insects and pathogens affect ecosystem functions and conditions by physically altering or killing their host trees. Activity in the Forks Watershed probably has increased since the turn of the century. The causes of this increase is a result of fire exclusion, the introduction of exotic organisms and extensive management activities. Other influential causes of the increased activity have been increased stocking levels, changes in species composition, soil disturbance and compaction, the creation of wounds and stumps, and the lack of co-evolved resistance mechanisms.

A wide variety of insects and diseases occur throughout the Middle Fork/South Fork Watershed. Those whose effects are most noticeable include three root diseases (laminated root rot, Armillaria root disease and Annosus root disease), several bark beetles, white pine blister rust and several species of dwarf mistletoe. Further discussion of these diseases and insects follow.

<u>Laminated Root Rot:</u> This disease occurs throughout the watershed. Infected areas can be identified by examining the roots of large, fallen trees. Smaller trees will die standing, not having enough mass to cause them to be windthrown. Root disease created openings may be colonized by susceptible conifers which fail to reach large sizes, by less susceptible conifers or by hardwoods and shrubs which are immune to the infection.

Laminated root rot is usually found in small pockets of less than one acre, up to five acres in size at the low and mid elevations in the watershed. At higher elevations, it causes medium to large size openings of one to fifty acres. In stands with a high component of mountain hemlock, laminated root rot plays a key role in promoting species and structural diversity.

<u>Armillaria Root Disease:</u> This rot disease is commonly found in stands throughout the Middle Fork and South Fork Watershed. Its primary impacts are causing actual tree mortality and/or making them susceptible to bark beetle attack. In most cases, Armillaria root rot pockets are small, usually a few acres or less in size. However, several large pockets affecting approximately 140 acres occur in the watershed, east of Forest Road 37 by Whitam Creek.

The impact of Armillaria has increased across the watershed as a result of management activity. Stumps created by logging have been colonized by the fungus, becoming an effective food base from which the fungus spreads to living trees. Soil compaction from ground based equipment has also contributed to favorable conditions for the spread of this fungus.

Annosus Root Disease: The impact of this third root disease is unclear across the watershed. Tree mortality from Annosus is rare, stem breakage is more common, and it is present in only a few scattered locations in the watershed. Occasionally, small understory true firs in proximity to infected stumps are found to be infected. It may be that Annosus root disease in the Forks Watershed has not developed sufficiently for large tree mortality to occur or that the effects are masked by other agents such as bark beetles and Armillaria root disease, before signs of Annosus become obvious.

Bark Beetles: Pine Bark Beetles are commonly active in the Forks Watershed. Western Pine Beetles were found infesting ponderosa pines and Mountain Pine Beetles were found attacking all pine species including ponderosa, lodgepole, western white and sugar pines. Although the number of recently killed trees in the watershed is low in comparison to the mortality that occurred in the late 1980's and early 90's, many stands are still at high risk due to heavy stocking levels resulting from the many years of fire exclusion.

Other bark beetles present in the watershed include the Douglas-fir beetle and fir engraver beetle. Both are commonly associated with root disease infected trees. In recent years, the fir engraver beetle caused mortality has been observed in root disease pockets and is commonly associated with drought stress, particularly in heavily stocked stands.

Small pockets of snowdown/blowdown trees are found throughout the watershed as a result of the recent winter storms. The Douglas-fir beetle population has increased in response to the sudden increase in down trees following the storms. Mortality in the surrounding trees is expected to continue as a result of the increase of the beetle population.

White Pine Blister Rust: In the Forks Watershed, white pine blister rust attacks sugar pine, western white pine and white bark pine. This fungus causes top-kill and tree mortality and may also increase the risk of bark beetle attack. Environmental conditions for spore survival and infection are good and adequate populations of the alternative host, *Ribes sp.* exist throughout the watershed. The result of these factors are that white pine blister rust is very common throughout the watershed.

Dwarf Mistletoe: Dwarf mistletoe is very common on Douglas-fir, the true firs, lodgepole pine, mountain hemlock and western hemlock throughout the watershed. This infection has resulted in growth loss, top-kill, distortion and eventually mortality for many trees. An indirect effect of this parasitic plant is the susceptibility to infection and attack by other agents such as Armillaria, or various bark beetles prevalent in the watershed.

## CONTROLS

Fire exerts natural control over forest insects and disease. It helps control the spread of dwarf mistletoe and creates conditions favorable for regeneration of root disease resistant trees. Fire can also be used as a natural technique to control the stocking level in stands.

Root disease conditions for project planning areas within the watershed should be assessed prior to conducting future management activities. Management can be used to help control spread by discriminating against susceptible species in areas of known root disease infestation. Other techniques in controlling the spread of insects or diseases include planting disease resistant species following management, minimizing soil compaction and promoting stand diversity in terms of structure and composition.

## SOIL CHARACTERISTICS

The soils of the Forks Watershed are divided into categories relative to their position on the landscape. The landscape is described as high elevation wilderness, middle elevation glacial moraines, canyons and canyon bottoms. See Map 9 for slope class locations.

The high elevation wilderness land type of the Sky Lakes Wilderness is derived from mountain glaciation. These landforms are a combination of glacial pluck, scour and fill deposits of soil. The pluck and scour landforms are convex rock knobs and headwalls with little soil in place. This landform can be found throughout the upper reaches of the Wilderness especially along the crest of the Cascades, the eastern watershed boundary.

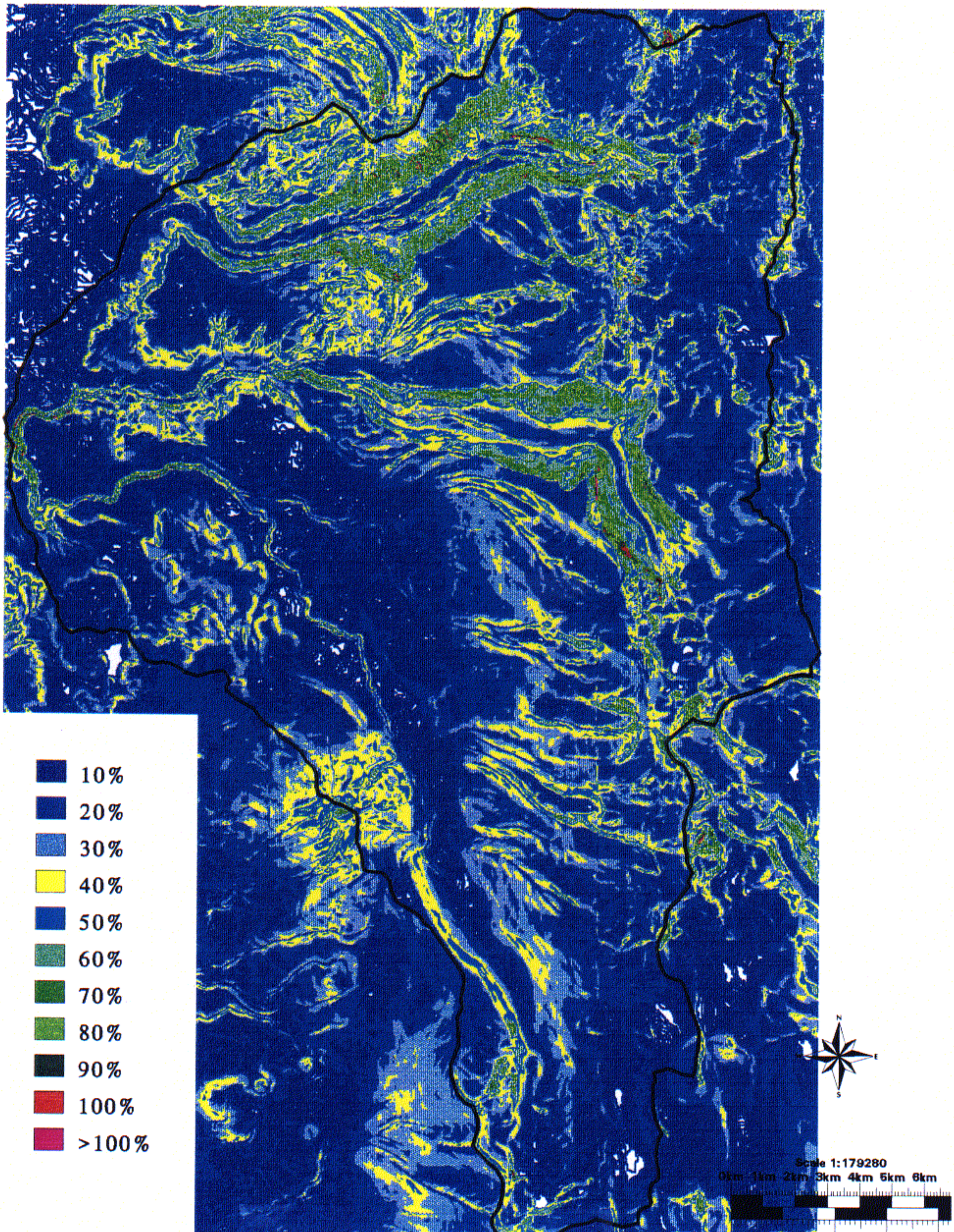
These soil deposits are moderately deep to deep (2 to 6 feet) and usually well to moderately well drained. Some deposits have evolved to meadows that occur throughout the high elevations or around the numerous lakes in the area. This high elevation environment maintains a soil climate that is very slow for vegetation response. The soils in this area are unable to modify the climatic effects due to their thermal properties, textures, colors and drainage characteristics.

The middle elevation landforms are dominated by glacial moraines including lateral moraines and ground moraines. These soils vary in depth and drainage depending on position in the moraine. These soils have a very high content of coarse fragments underlain by tillite-like material which contributes to slow permeability and high rates of run-off laterally through the soil. This ground is highly susceptible to site change through impacts from ground based harvest equipment. The soil of the moraine tops are generally shallow resulting in a marginal timber producing site.

# South Fork & Middle Fork Watershed

MAP 9

## Slope Class



The canyons were created and modified by glacial ice with soil deposited on the sides. Over time, these soil deposits have been modified by erosional action that have resulted in slopes with shalow soil depths except at the slope toe positions. Red Blanket and Middle Fork Canyons are excellent examples of this condition. Bed rock outcrops are exposed as horizontal bands or sporadic outcrops.

These slopes are generally steep and subject to rapid run-off of precipitation. Vegetation on the slopes is aspect dependent. The south facing slopes are very dry and subject to a high fire occurrence. They are very slow to recover from vegetation manipulation or physical changes. They tend to experience a long successional period from brush to trees.

The canyon bottoms are characterized as outwash deposits. The soils are deep to very deep and subject to erosional cutting and deposition. Generally, these soils are very gravely, cobbly or stoney-sandy loams. They are generally well or excessively well drained.

The landforms at the lower elevations, below the glacial moraines, are derived from volcanic activity. The land consists of flats, foot-slopes and back-slopes, most of which are covered by pumice. These soils range in production capacities and need to be site specifically evaluated. See Map 10 for soil stability and risk assessment locations.

## EFFECTS OF PAST MANAGEMENT

Soil productivity in the watershed is a key component in evaluating vegetative conditions and overall ecosystem health. Many of the soil types that exist in the watershed have been degraded by management activities resulting in a loss of sustainability and productivity.

Approximately 60% of the managed lands in the watershed have had productivity levels degraded to some degree. The main cause of soil degradation has been from top soil displacement and compaction from ground based equipment used to harvest timber, fuel treatment or from site preparation for reforestation.

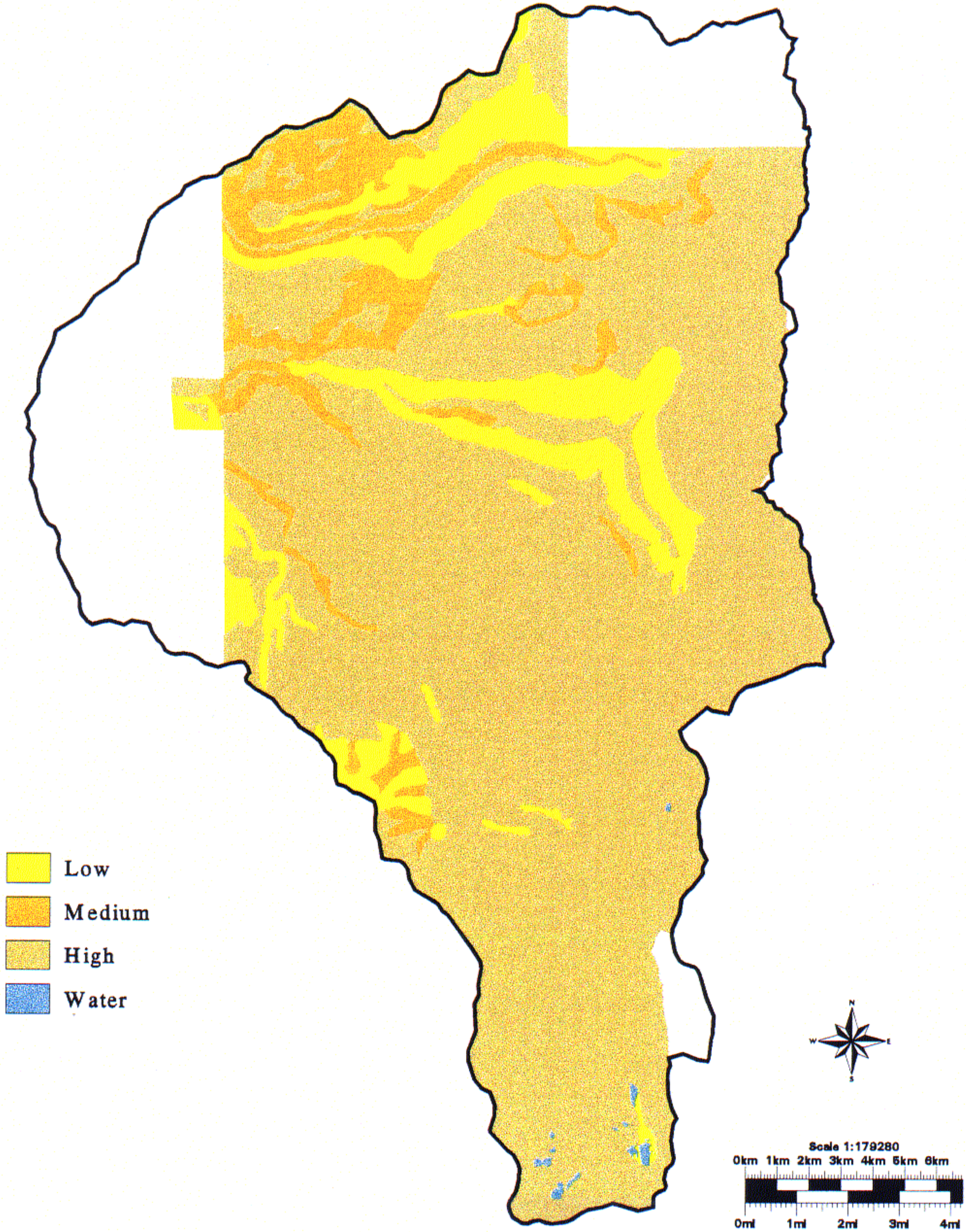
The Forks Watershed contains soils that erode easily if exposed. Soil organic matter is slow to accumulate due to environmental conditions in the watershed. The south exposures are especially hard to recover from any type of planned or natural change.

Run-off from overland flows that lead into the streams of the watershed have increased as a result of management activities. This increase in overland flow is compounded by soils that do not normally drain well and where management activities have created poor drainage conditions. The impact has been a decrease in water quality from a higher than normal concentration of organic material and higher nitrogen/phosphorus levels being carried into the streams.

# South Fork & Middle Fork Watershed

MAP 10

## Soil Stability



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## GEOLOGIC LANDFORMS

The Forks Watershed is underlain by the relatively youthful geologic formations of the High Cascades physiographic province. Refer to Figure 1 of the Geology Appendix, which shows the watershed situated at the upper-most western flanks of the High Cascade Range. The formations vary in age from 6,800 to over 8 million years old. The cascade Range is a northerly trending, continuous belt of volcanic mountains stretching from northern California into southern British Columbia.

Figure 2 in the Geology Appendix shows the relation of the watershed to the adjacent geologic provinces. The Western Cascades physiographic province lies to the west and is composed of volcanic deposits which are about 10 to 20 million years older than the High Cascades rocks. East of the High Cascades Range is the Basin and Range province. This is the familiar fault block mountain and valley system seen throughout the Klamath Basin region. The major faults near the east boundary of the watershed begin at the headwaters of the Middle Fork and continues due south along the crest of the western divide. It is along this fault system that the most recent volcanic peaks have grown. Figure 3 in the Geology Appendix is an example of how the fault systems and volcanic activities are connected in the Forks watershed. The diagram also shows how volcanoes are generated by subduction of the east Pacific Oceanic Plate underneath the North American Continental Plate.

The Forks Watershed analysis area contains numerous volcanic vents and associated valley filling lava flows. A few of the more familiar volcanic vents in the area include: Blue Rock, Rustler Peak, Lodgepole Peak, Bessie Rock, Cinnamon Peak, Red Blanket Mountain, Devils Peak, and Union Peak.

Superimposed upon the volcanic landscape are the effects of extensive glaciation extending from the backbone of the High Cascade peaks down through the canyons of Red Blanket Creek and the South and Middle Forks of the Rogue. As recently as 15,000 years ago, a nearly continuous ice field covered the High Cascades from Mt. Hood in the north, to Mt. McLoughlin in the south.

Glaciation caused thorough erosion and transformation to the existing terrain. Where large symmetrical volcanoes previously stood, glacial cirques and lakes now dominate the landscape. For example, Ruth, Ethel and Maude Mountains, found along the northeast crest of the watershed, are the remains of the volcanic cores of these mountains. The lava flows that flanked these volcanoes have been stripped away by the glaciers. The lower slopes and valleys are blanketed with thick deposits of glacial till scoured from the upland topography.

The high rates of precipitation and winter snowfall in this region gives rise to the abundant creeks in the watershed. This precipitation slowly percolates through the highly fractured volcanic deposits only to emerge on the mountain slopes in the countless springs that feed the stream and river systems.

## GEOLOGIC MATERIALS

Map 11 shows the types and distribution of rock formations and surficial deposits (glacial and alluvial). This reveals that the watershed has been blanketed by deposits left by recent and older glaciers. There are two age groups of volcanic formations in the watershed area. The older deposits are 2 to 8 million years old, while the younger rocks range from 1 million to 6,800 years old.

The vast majority of volcanic vents in the watershed have formed tall, steep-sided peaks known as composite volcanoes. The younger lava flows of intermediate composition (andesites and basaltic andesites) dominate the watershed. These innumerable lava flows are interbedded with volcanic ash, cinders and breccia.

The more fluid lava flows of basalt can be found exposed in the watershed. These basalt flows are from older formations, many of which have been buried by the more recent andesitic flows from the volcanic peaks. Basalts are found exposed in the valley regions along Red Blanket Creek and the South Fork of the Rogue. They can also be found between Red Blanket Canyon and Middle Fork Canyon, two miles west of Bessie Rock. Basalt formations are well exposed in the deep canyons carved at the confluence of the tributaries and the main stem of the Rogue River.

The culminating eruption of Mt. Mazama approximately 6,800 years ago left deposits of partially welded ashflow and airfall pumice in the northern portion of the watershed. The main body of the ashflow traveled down the west flanks of Mt. Mazama and along the main stem of the Upper Rogue River. The bottom of Red Blanket Canyon has substantial amounts of these deposits. Remnants of the ashflow are also found in both the South Fork and Middle Fork of the Rogue. Some of these deposits may have formed from the ashflow surging upstream along the bottom of these drainages.

## EROSION

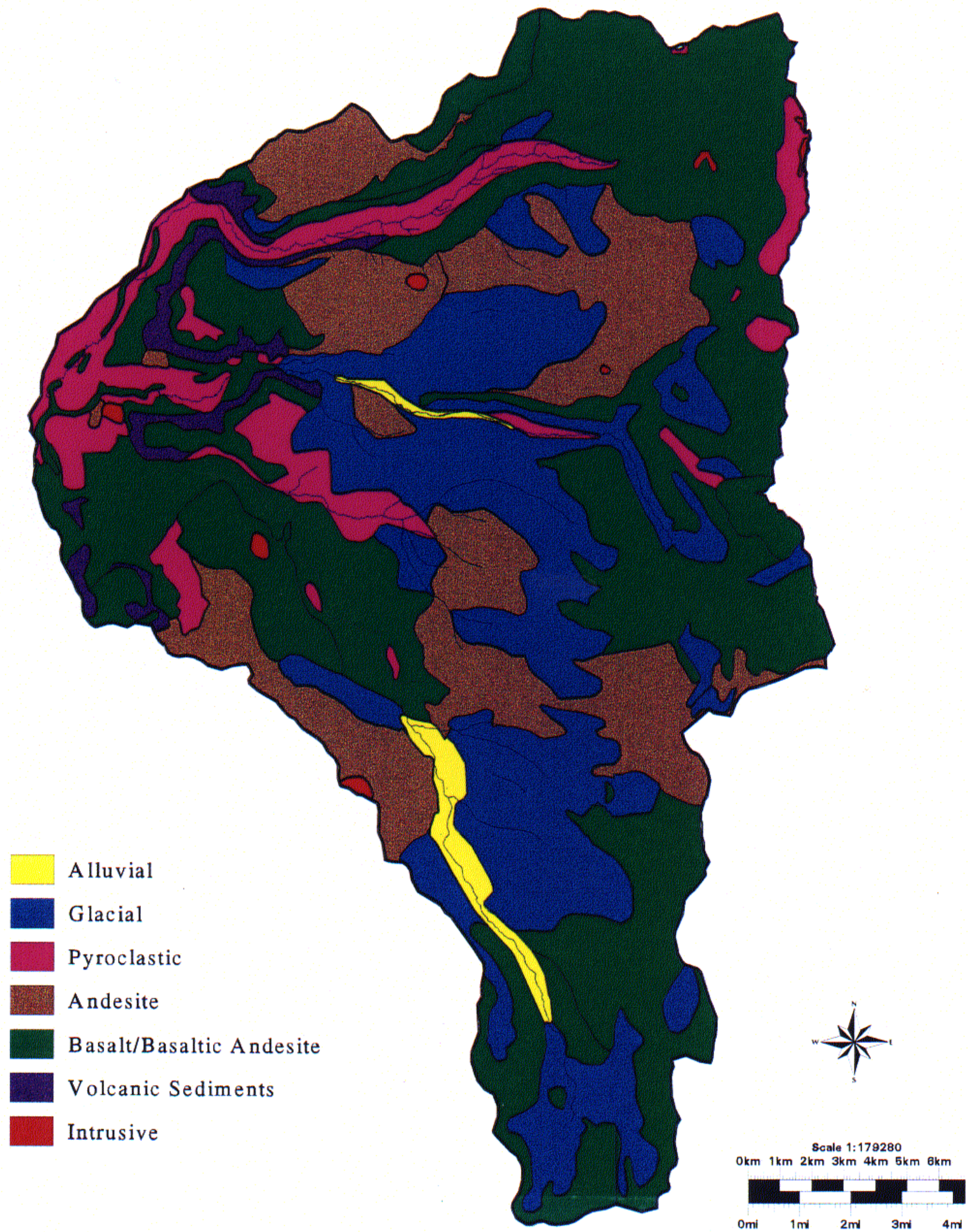
Erosion is the dislodging, transportation and deposition of soil and rock from the landscape in response to the force of water, wind or ice. These agents of erosion are directly related to the climate of the region, both past and present. The climate itself is influenced by the landscape.

The formation of the High Cascade Range created a formidable barrier to the easterly moving weather fronts. This caused climatic changes to the region in the form of increased precipitation as both rain and snow on the western slopes of the mountain range. The resulting snowfall led to the glacial ice which so thoroughly scoured and eroded the terrain. The retreat of the glaciers left steep canyon walls as seen in Red Blanket, Middle Fork and South Fork canyons. These steep walls are subject to accelerated rates of erosion, particularly once a drainage channel becomes entrenched. These sites can become the origin of snow avalanche chutes or debris slides.

# South Fork & Middle Fork Watershed

**MAP 11**

## Geologic Rock Types



The erosive forces of the rivers have easily cut through the ashflow deposits along the canyon bottoms. The widespread glacial deposits in the watershed are not prone to excessive erosion due to their relatively gentle slopes and high rock content. Glaciers did a thorough job of removing topsoil and leaving barren rock at the upper elevations. Soil erosion from the upper elevations is minor.

## MASS WASTING

Mass wasting is the wearing away of the landscape brought about by the downslope movement of soil and rock due to gravitational forces. Steeper slopes are more likely to be influenced by the mass wasting process. The most commonly recognized forms of mass wasting found within the watershed area are debris slides found on the steep glacially carved canyon walls. Rock fall is common from the rock outcrops on the exposed canyon walls and glaciated alpine regions.

An aerial photography survey confirmed that the majority of slope instability is limited to the steep, glacially carved canyon walls of Red Blanket and Middle Fork canyons. There are numerous inactive debris slides and snow avalanche chutes visible along these canyon walls.

## MINERAL AND ENERGY RESOURCES

There are abundant reserves of sand and gravel resources found within the watershed area. In addition, large amounts of fresh lava flows suitable for crushed rock and large rock for road construction are found. A number of rock pits and quarries are established within the watershed which are expected to adequately serve the needs of foreseeable future projects.

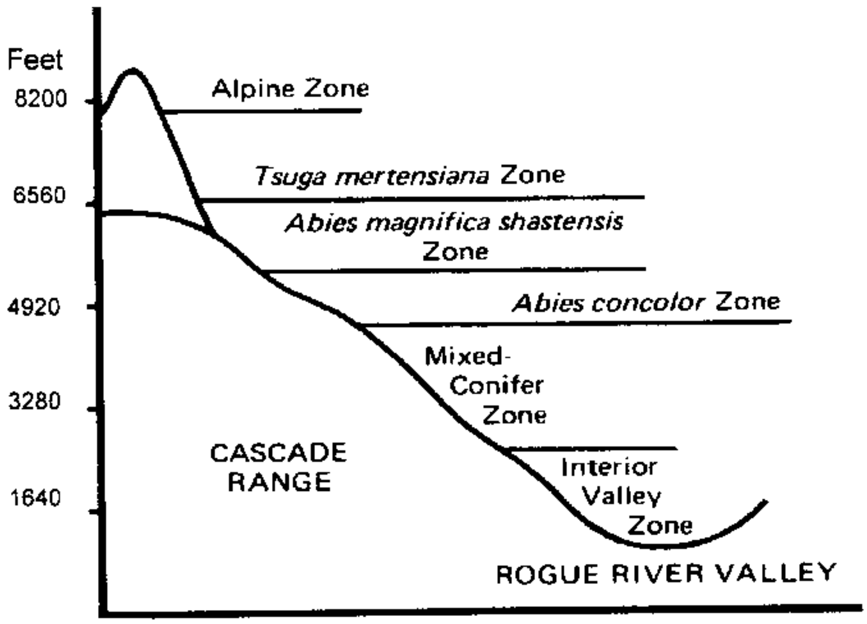
There are no known resources of metallic minerals, geothermal energy or petroleum deposits within the watershed. Inventories and studies indicate there is little potential for the discovery of such resources in this watershed.

# PART III
# PRESENT CONDITION

## VEGETATIVE STRUCTURE

The vegetation in the Forks Watershed is typical of the vegetative communities in southwest Oregon described by Franklin and Dyrness (1973). The vegetation in the watershed may be classified into general forest zones based on elevation (Figure1). Generally, the hottest and driest conditions are in the Interior Valley Zone while the coolest and wettest is the Alpine Zone.

**Figure 1. Arrangement of Vegetation Zones in the Southwestern Oregon Cascade Range.**




Very little of the Interior Valley Zone is found within the Forks Watershed. Moisture and temperature are the most limiting factors for this system, being too hot and dry for montane coniferous forests. This zone can be identified by small, open grown trees with a well developed mix of grass and shrubs beneath. This zone is only found in the lowest elevations of the watershed. Typical tree species in this limited zone are Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), incense cedar (*Calocedrus decurrens*), and small amounts of sugar pine (*P. lambertiana*). Hardwoods include Pacific madrone (*Arbutus menziesii*), white oak (*Quercus garryanna*), California black oak (*Q. kelloggii*) and minor amounts of other species.

The Mixed Conifer Zone occupies the largest portion of the watershed. Typical overstory conifer species are Douglas-fir, white fir (*Abies concolor*), ponderosa pine, sugar pine, western white pine (*P. monticola*) and incense cedar. Hardwood trees include Pacific madrone and golden chinkapin (*Castanopsis chrysophylla*). The trees occur in many combinations and mixtures. Understory species are seedlings and saplings of Douglas-fir and white fir; while hardwood and shrub species include golden chinkapin (usually the shrub variety), California hazel (*Corylus cornuta*), Pacific dogwood (*Cornus nutallii*) and others.

Low ground cover and herbs include western twinflower (*Linnaea borealis*), vine maple (*Acer circinatum*), Douglas maple (*A. glabrum var. douglasii*), serviceberry (*Amelanchier alnifolia*), pinemat manzanita (*Arctostaphylos nevadenisis*), dwarf Oregongrape (*Berberis nervosa*), common prince's pine (*Chimaphila umbelata*) and countless other plants. There is much variation among these layers in composition and density. They occur in many combinations depending on elevation, aspect, light, temperature, moisture and nutrients.

The White Fir Zone occurs at a higher elevation than the Mixed Conifer Zone. It occupies a relatively narrow belt between 4500 and 5500 feet above sea level. It may simply be an upper altitudinal variant of the Mixed Conifer Zone or an ecotone between the Mixed Conifer and the Shasta Red Fir Zone (Franklin and Dyrness, 1973). White fir is the major tree species in this zone, often forming nearly pure stands. Douglas-fir is the main associated species, but western white pine, sugar pine and ponderosa pine may also be present. Lodgepole pine (*P. contorta*) is a pioneer species for this zone. White fir is the dominant regenerating species. Common herbs include western twin flower, vanillaleaf (*Achlys triphylla*) and common prince's pine.

The Shasta Red Fir Zone is above the White Fir Zone in elevation. The major tree species is Shasta Red Fir (*A. magnifica var. shastensis*). Mountain hemlock (*Tsuga mertensiana*), white fir, western white pine, lodgepole pine are the most common associated species. Douglas-fir, Engelmann spruce (*Picea engelmannii*), ponderosa pine and subalpine fir (*A. amabilis*) may also be found in this zone in the watershed. Several of these species require specialized habitats, for instance, Engelmann spruce is usually located in the moist to wet microsites. Understory seedlings and saplings include mountain hemlock, generally below a closed overstory stand, and Shasta red fir where small openings have been created by disturbance. Forest floor herbs vary widely in composition and density depending on moisture and temperature regimes. Conditions may range from no ground cover to a few scattered plants to a continuous cover of herbs. Such plants as prince's pine, grouse huckleberry (*Vaccinium scoparium*), Pacific blackberry (*Rubus ursinus*), western starflower (*Trientalis latifolia*), vanillaleaf and many others may be present.

The Mountain Hemlock Zone is located above the Shasta Red Fir Zone in elevation. In the Forks Watershed, the Mountain Hemlock Zone can be found in Crater Lake National Park and in the Sky Lakes Wilderness Area. The forests of this zone have a comparatively simple structure and composition in terms of stand diversity. The most common overstory trees of this area are mountain hemlock and Shasta red fir, with minor amounts of Engelmann spruce, lodgepole pine and minor amounts of ponderosa pine and Douglas-fir. An understory is usually absent in these stands due to dense canopies and species tolerance. When present, understory species include prince's pine and/or grouse huckleberry with minor amounts of pinemat manzanita and other plants. One interesting point about this zone in the southern Oregon cascades is the high incidence and severity of dwarf mistletoe on mountain hemlock.

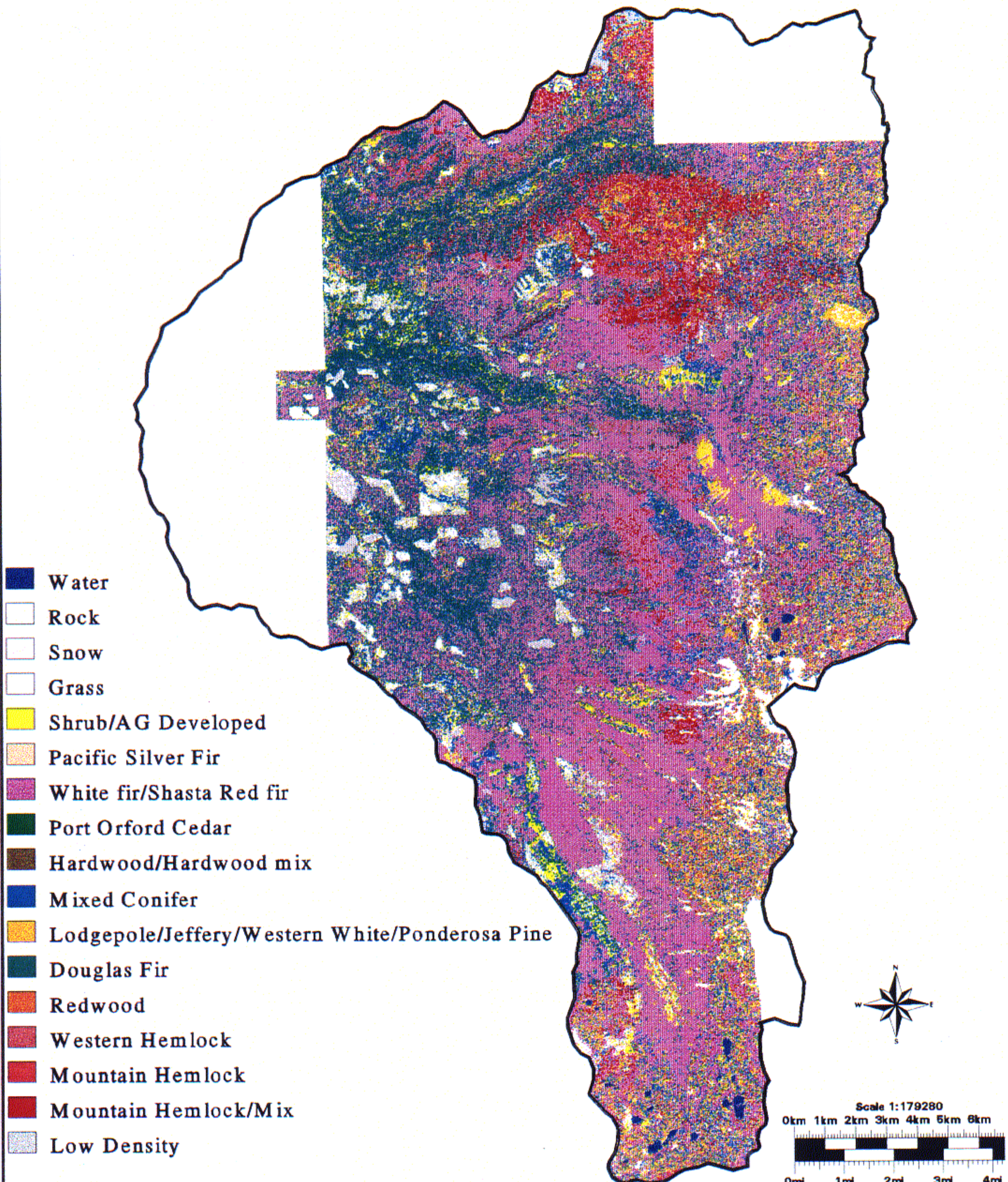
The Alpine Zone occupies a narrow band at the highest elevations in the Forks Watershed. This area is characterized by scattered groups or groves of trees between natural openings and meadows, with tree cover usually being sparse.

Species groups developed by Pacific Meridian Resources (PMR) using satellite imagery, were lumped using "professional judgment" to determine the vegetation zones. Map 12 shows the location of species groups in the watershed.

MAP 12

# South Fork & Middle Fork Watershed

## Species Groups



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## SERIES AND PLANT ASSOCIATION

Plant Series is an aggregation of Plant Associations named for the climax or late-successional dominate indicator plants of a given area. The plant series found in the Forks Watershed are influenced by precipitation, soil temperature, soil depth, elevation and aspect.

The Forks Watershed is located in the southern portion of the Cascades physiographic province. This province contains the mountain hemlock-Shasta red fir series, the white fir series, the western hemlock series, the Douglas-fir series and the ponderosa pine-oak series. Minor series found in the watershed include the lodgepole pine and the Shasta red fir series.

The mountain hemlock series is often found on glacial cirques in the watershed. It occupies about 7% of the area in cold and moist to wet environments. The average annual temperature is 41 degrees F and is considered to be among the coldest climates for any series. The average elevation where this series is found is approximately 5350 feet above sea level. It is most often found on north to northeast aspects, on deep soils and slopes averaging 17%. Cold soil and air temperatures reduce survival and growth of trees at the highest elevations.

The Shasta red fir series is a minor series in this watershed. This series occupies the cold, moist to wet locations at an average elevation of 5930 feet above sea level. The series can be found on most aspects but prefers the northern, steeper slopes. However, it will be found on the flatter slopes in the Forks Watershed. Soils for this series are generally deep, although considerable variation is present. Extremely cold soil temperatures at the uppermost locations reduce the survival and growth of trees in this series, while lack of moisture and warm temperatures prevent Shasta red fir from achieving maximum production at the lower elevation of the series.

The white fir series is the most wide-spread, most diverse and most productive series of the watershed. It is found in cold to warm, wet to dry environments on most aspects, at an average elevation of 4100 feet above sea level. The white fir series occurs on soils that average 41 inches deep and on slopes that average 28%. Many different factors affect biomass production on white fir sites, due mostly to the wide range of environments where the series occurs. On very warm and dry sites, for example, moisture is the limiting factor to survival and growth, favoring Douglas-fir on a white fir site. Parent material, elevation and local climate can produce unique associations in this series.

The Douglas-fir series is distributed over 5% of the watershed area. It occupies warmer and dryer climates than the white fir series. The average annual temperature for the site is 48 degrees F. with a maximum of about 83 degrees F., the highest of all significant series. This series occurs at an average elevation of 2890 feet above sea level and on slopes that average 44%. Soil depth is 35 to 39 inches and the mean aspect is to the south. This is the hottest aspect on the Cascade province. Low moisture and hot temperatures limit growth and survival in this series. This series is found only on the private land in the east portion of the watershed. The exact location does not show on the Map 12.

The western hemlock plant series can be found in small, localized microsites within the watershed. The sites are always cool and moist with an average mean temperature in the 40's. This series occurs above 3300 feet and on northwest aspects. Soils depths are near 40 inches and slopes average 33%.

The ponderosa pine-oak series is found at the lowest elevations and on a small portion of the watershed. This series is typically located on the hotter and drier sites compared to the other series in the watershed. The site is dominated by ponderosa pine but there are usually other associated species. The soils in this series are the shallowest of all in the southern Cascade range and growth and survival are reduced by the hot and dry conditions. See Map 13 for series locations.

## LANDSCAPE PATTERN

One hundred or more years ago, most of the low to mid elevation forests of southwest Oregon, including those of the Forks Watershed, were structurally and compositionally different from today's forest. In those days, fire occurred as often as every 20 to 30 years. This occurrence was probably more frequent at the lower elevations and less frequent at the higher, wetter sites including riparian zones and north aspects. These fires were usually of low intensity and mostly ground fires that maintained the watershed in an early seral condition. Timber stand composition included ponderosa pine and scattered Douglas-fir trees. The forests were open allowing one to see considerable distances in all directions, unlike the stands of today. There were few patches of dense seedlings, saplings and poles of white fir and Douglas-fir. The forests had a simpler structure and composition and were more resistant to insects and disease such as dwarf mistletoe, which was less prevalent compared with current conditions.

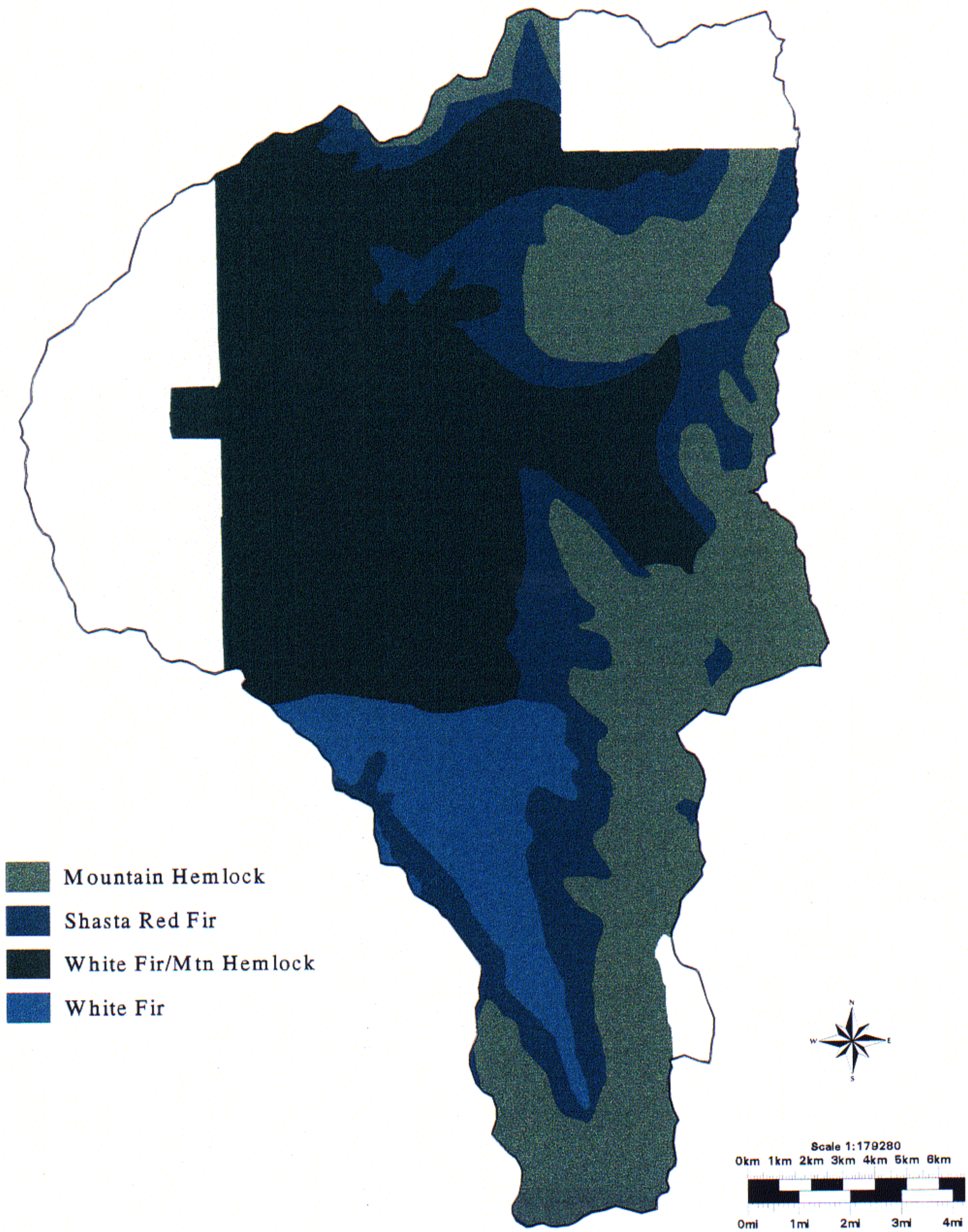
Since the initiation of aggressive fire suppression, the ingrowth of shade tolerant species has increased stand basal areas to a point above what is considered to be an appropriate level for a healthy forest. Fire exclusion has allowed the more tolerant white fir and Douglas-fir to develop in dense understories over a significant portion of the watershed. Fuel loads and ladder fuels have increase the risk of wildfire across the landscape. This dense stocking level is taxing the ecosystem's resources making the competition between trees intense. Early seral tree species, such as ponderosa pine, have especially suffered in these conditions. This stressed environment creates favorable conditions for successful disease and insect attacks, a situation aggravated by the recent drought. Trees killed by insects and disease are continuously adding to the fuel load and increasing the risk of catastrophic fire.

Vegetation mapping from the late 1940's shows a different landscape portrait for the watershed compared with the current vegetation composition. See Maps 14 and 15 for this comparison. These maps should only be used to compare general trends and changes. Some differences can be attributed to different interpretive techniques and rules used to classify vegetation. However, most differences can be attributed to timber management, fire exclusion and the mortality of pine due to disease, insects and drought. Figure 2 compares the 1948 vegetative condition with the current vegetative types of the watershed.

# South Fork & Middle Fork Watershed

MAP 13

## Plant Series



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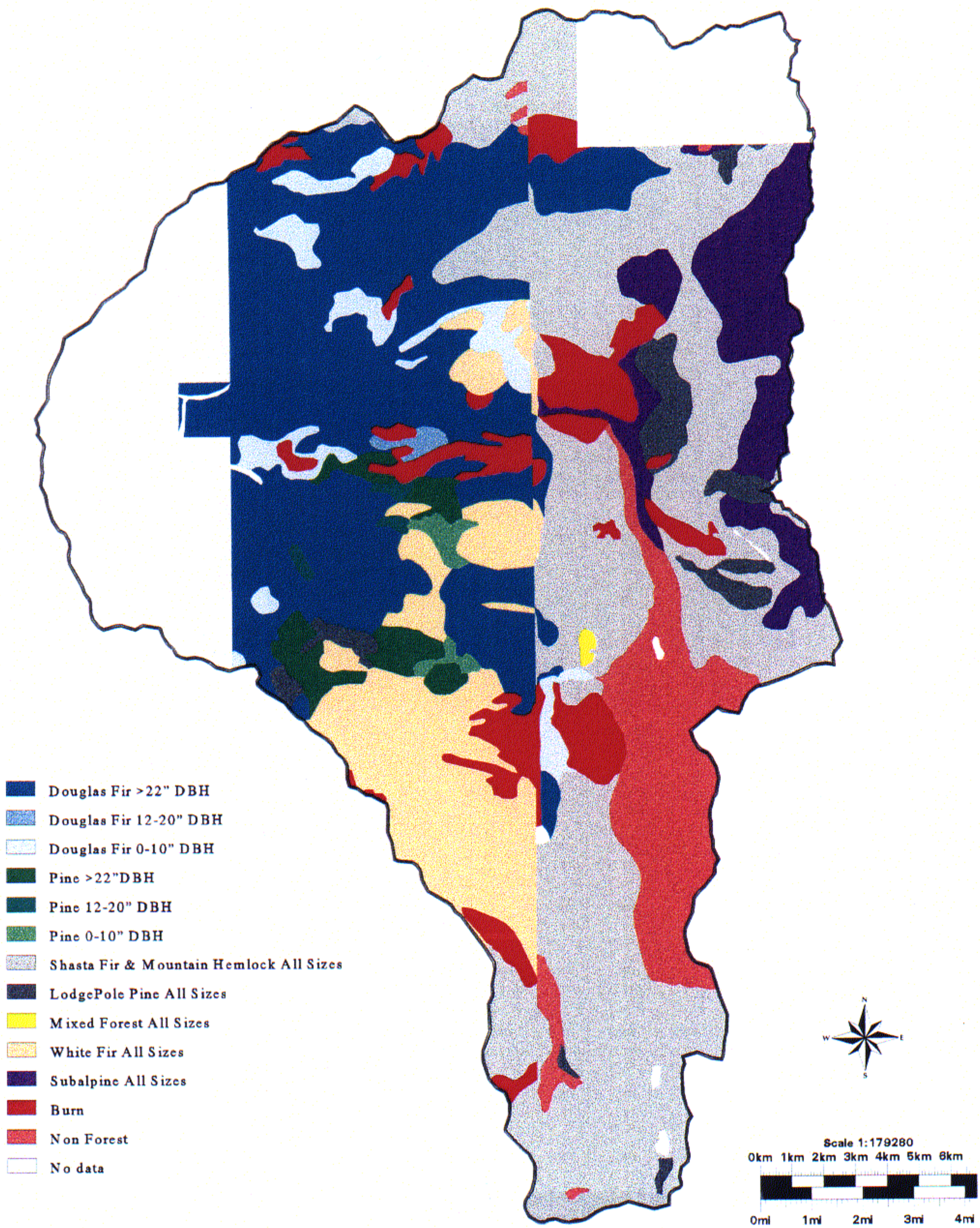
# South Fork & Middle Fork Watershed

**MAP 14**

## 1948-49 Historical



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MAP 15

# South Fork & Middle Fork Watershed

## Current Vegetation - 1994 Satellite Imagery

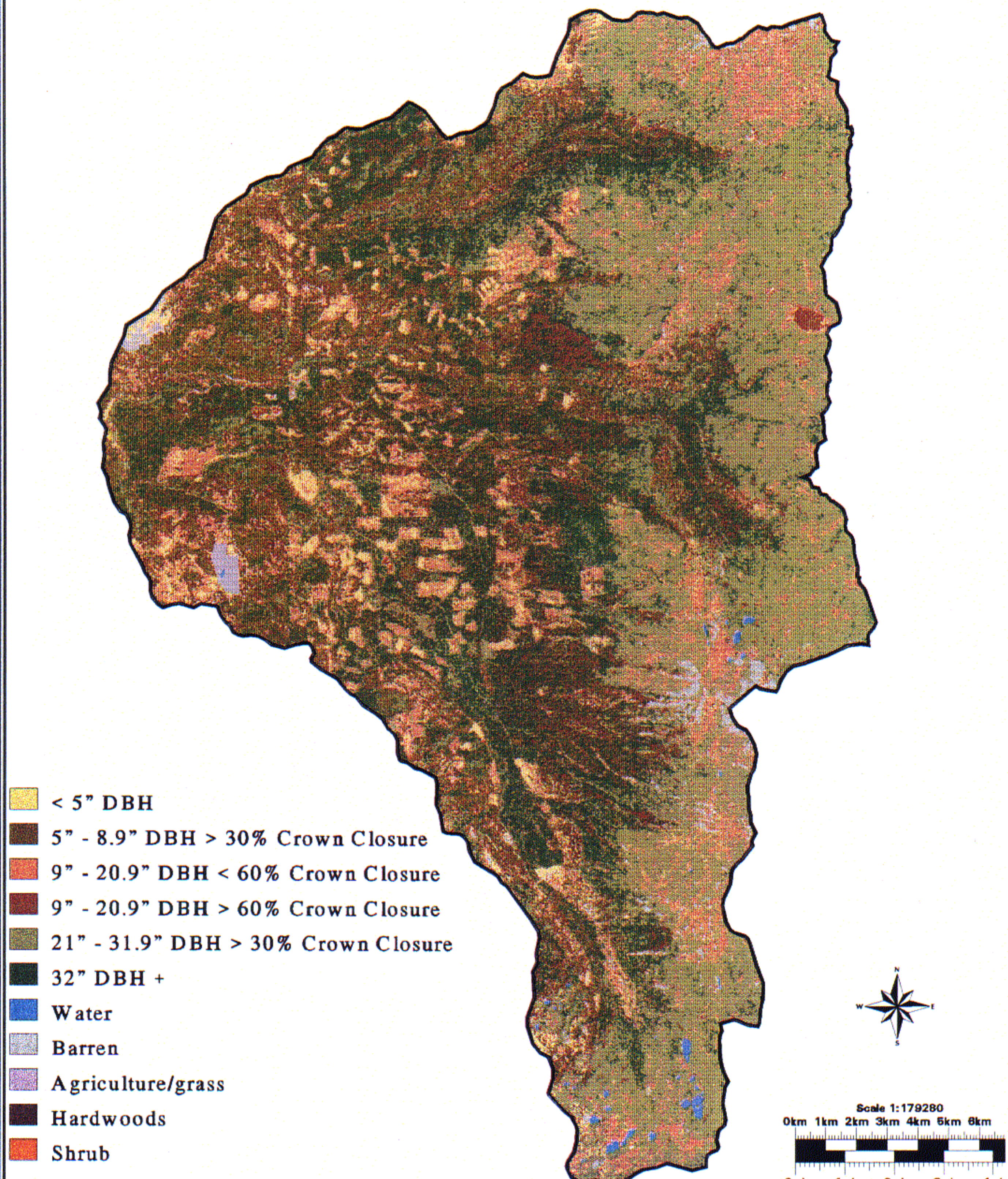




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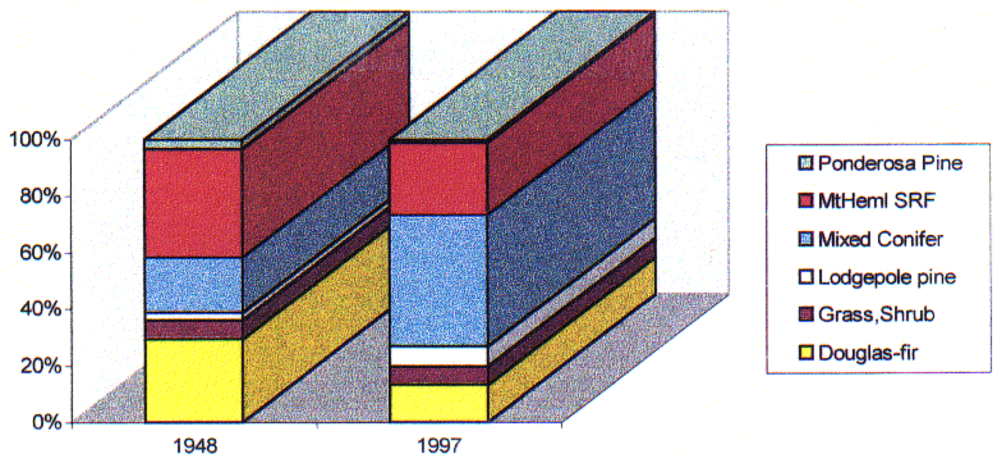
Figure 2 shows that Douglas-fir dominated stands made up 29% of the area in 1948 and 13% in 1997. Mixed conifer stands occupied 20% of the area in 1948 and 46% in 1997. The mountain hemlock/Shasta red fir species group occupied 39% in 1948 and covers 26% in 1997. Lodgepole pine stands increased from 3% in '48 to 7% in 97', while ponderosa pine decreased from 3% to 1% in the same time period. The area in grass and shrubs remained the same for the past 50 years, at 7%.

**Figure 2. 1948 and 1997 Vegetation Comparison.**




There is no specific data showing the presettlement seral stages, stand densities and composition of stands in the watershed. The information given above could serve as a baseline for monitoring future activities and changes. It would be impossible to say if those values are appropriate to use in evaluating the range of conditions over time and determining the historical range of variability.

Suppression of fire in the last 80 years has caused stands to become much more dense than they were historically. Most of the ingrowth has been by shade tolerant species as evidenced by the more than doubled increase in area of the mixed conifer species group. This trend of stand "densification" has reduced stand resilience and productivity, two characteristics of healthy ecosystems.

### Seral Stages

The proportions of seral stages in the Forks Watershed are based on PMR satellite imagery and is the best available information at the time of this analysis. Seral stages present in the Forks Watershed are:

| | |
|---|---|
| Water, Rock | 2% |
| Pioneer | 5% |
| Early Seral | 8% |
| Mid Seral | 54% |
| Late Seral & Climax | 23% |
| Shelterwood | 8% |

**Table 3. Comparison of Habitat Conditions in the Forks Watershed (1947/49 versus Condition Class versus PMR).**

| Map Comparison Code | 1947/49 County Vegetation Mapping (acres) | Condition Class Vegetation Mapping (acres) | PMR Vegetation Mapping (acres) |
|---|---|---|---|
| OG - Old-Growth | 83,802 | 33,337 | 31 |
| Mid Seral | 41,071 | 68,083 | 47,620 |
| Transition Early Seral | 81 | 9,802 | 24,748 |
| Early Seral | 19,533 | 11,946 | 18,876 |
| Other | 0 | 6,711 | 0 |

The pioneer stage represents grass and shrub openings and areas that are regenerating after ground disturbance or regeneration harvest. The species composition is highly variable and short lived.

Early seral stages includes stands of trees generally having a diameter of 9" or less. Early seral stands in the Forks Watershed are stands that were harvested and regenerated 15 to 40 years ago or were initiated after natural disturbance, such as fire, as much as 100 or more years ago. Some of these fire generated stands exist on the south facing slopes of Middle Fork and Red Blanket Canyons.

The mid seral stage includes stands having diameters from 9" to 21". These stands would have begun their life 40 or more years ago after a natural disturbance or regeneration timber harvest. Some trees in this stage are present in older stands as a result of fire exclusion. They were able to develop in the understory of the formerly open, older stands.

The last seral stage or climax condition generally includes trees with diameters over 21" in diameter. These stands are generally over 130 years old, self-maintaining, self reproducing through the developmental stages and relatively permanent. The vegetative community is tolerant of the environmental conditions it creates and maintains a balance between energy production and energy release, nutrient up-take and nutrient return. In the Forks Watershed, this condition is found in or near riparian areas, steep canyon walls and selective sites in the Sky Lakes Wilderness where management activities are limited.

Shelterwood stands are not considered to be a seral stage but are difficult to place in any of the above categories. Generally, there are two distinct layers associated with these stands, an understory regenerated and planted 5 to 20 years ago and an existing overstory trees from a mid or late seral forest.

**Stand Density**

PMR data indicates that 19% of the watershed is covered by stands having 11% to 40% crown closure, 31% of the area has a crown closure between 41% and 70% and 44 % of the area has a crown closure of 71% to 100 %. Grass, brush, rock and water make up the remaining 6%. The stands with the lowest crown closure are shelterwood treated stands or areas in the process of regeneration. Some may be recent intensively managed stands such as clearcuts and others may be natural areas unable to support a higher stocking level due to site conditions.

Stands with crown closures between 71% and 100% are generally the stands that have developed naturally with little disturbance, although some may have been recently thinned. The remaining stands are somewhere in-between, they have experienced various levels of management or natural disturbance. See Map 16 for a comparison of historical, current condition class and current satellite seral stage condition.

**Plant Communities**

Plant communities in the Forks Watershed are characterized by the vegetation present in the system. The classification in this description is based on PMR interpretations of the species groups represented by the satellite data. The plant communities present in the Forks system are:

| | |
|---|---|
| Water, Rock, Grass, Shrubs | 6% |
| Hardwood Forest | 1% |
| Mixed Conifer Forest | 60% |
| Lodgepole Pine Forest | 7% |
| High Temperate Forest | 26% |

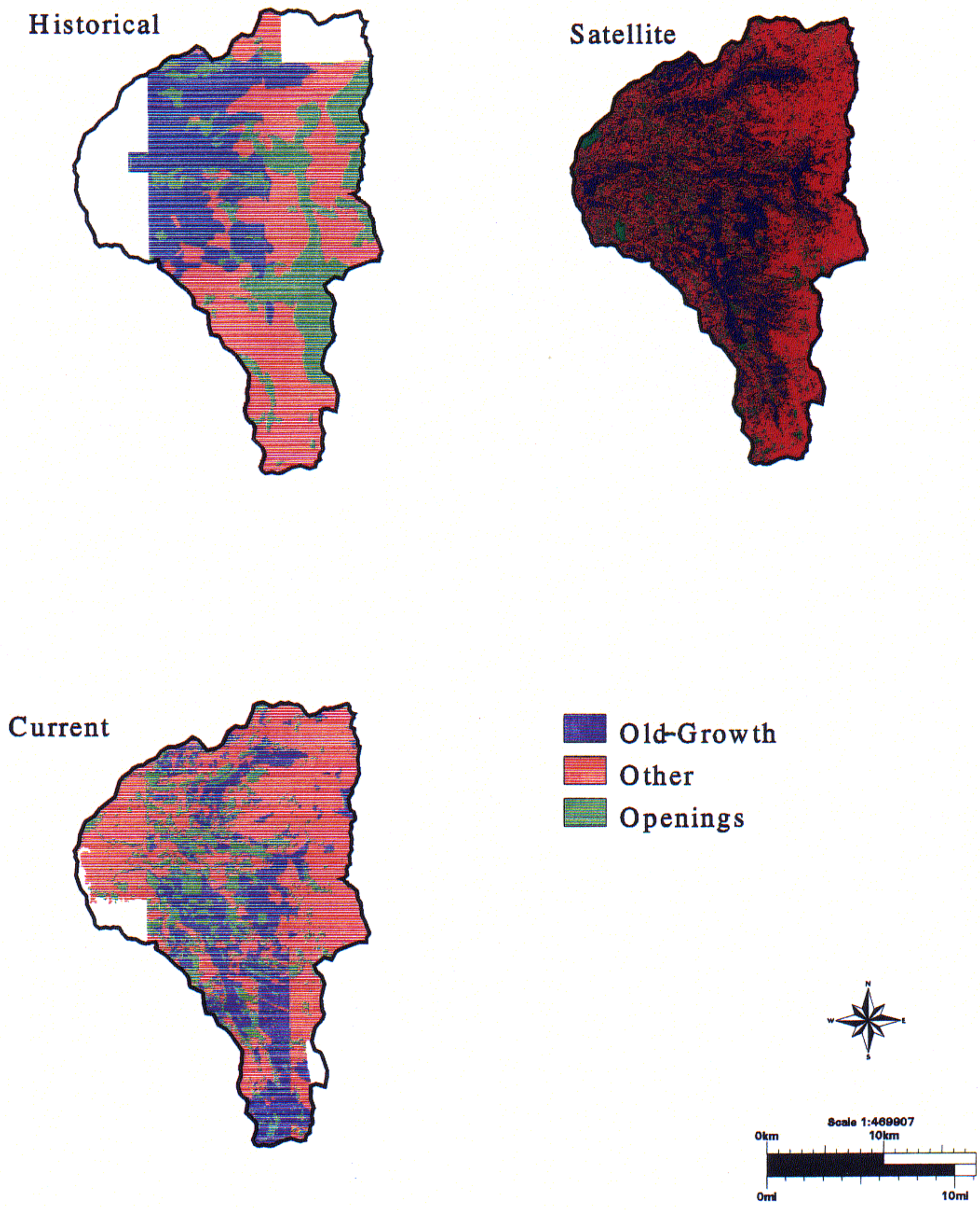
**Disturbance**

There is no known research of disturbance specific to the Forks Watershed. However, the Southwest Oregon area has been studied by ecologists and generalizations about disturbance can be made that apply to this watershed.

As previously stated, the most prevalent disturbance factor in the watershed was fire prior to European settlement. Southwest Oregon ecology plot data shows that over 90% of all plots taken have evidence of past fires. These fires, whether intentionally set or natural occurring, burned parts of the landscape annually. Fire was used to eliminate brush, produce new forage for game, promote the growth of huckleberries and other desirable plants. Fuel accumulation was slow and they burned with a low intensity because of the frequency of the fires. Most stands were open and contained fewer Douglas-fir and white fir than at the present time. However, in riparian areas, Douglas-fir grew in large numbers and to impressive sizes. Overall, most of the Watershed would have been considered open and contained more seral ponderosa pine compared with today.

MAP 16

# South Fork & Middle Fork Watershed
## Seral Stage



In the higher elevations, stand replacement fires were less frequent due to moisture and temperature conditions that discouraged fire. With fire intervals spaced far apart, natural fuels accumulated and resulted in more intense fires compared to lower elevations. Large portions of stands would be replaced during many of these burns.

Human disturbance has become the most common and intense agent of change in the watershed. Timber harvesting and road building are the most common examples of this disturbance. 14,421 acres of available timber land have been treated under a timber harvest prescription since the 1950's. The Forks Watershed contains 294 miles of road that was constructed mainly to access the timber resource with the added benefit of general accessibility and fire control.

Wind, disease, landslides, floods, weather events and insects in combination have probably caused only a small portion of the disturbance in the watershed. Disturbance related to insect and disease infestations have been on the increase due to stress on the ecosystem from fire exclusion, drought, intensive logging practices and incomplete knowledge of disease vectoring mechanisms.

There has been a considerable shift in the fuel composition across the forest floor. Today, more of the down wood component is in the smaller diameter ranges (Table 4). The South Cascades LSR Assessment (1998) indicates that the down wood component was historically larger sized material. Past management practices has probably influenced this change.

**Table 4. Summary of Dead Woody Material Tons Per Acre, by Plant Series.**

| | Pieces per acre by small end diameter and length | | | | | | Mean Length | Mean Decay |
|---|---|---|---|---|---|---|---|---|
| Small end diameter | 6-15.9" | 6-15.9" | 16-23.9" | 16-23.9" | 24"+ | 24"+ | (feet) | (Class) |
| Piece Length | <16' | 16+ | <16' | 16+ | <16' | 16'+ | | |
| White Fir | ABCO | | | | | | 30 | 3.4 |
| median | 27 | 16 | 0 | 0 | 0 | 0 | | |
| mean | 56 | 20 | 8 | 2 | 3 | 2 | | |
| range | 0-462 | 0-81 | 0-109 | 0-19 | 0-82 | 0-18 | | |
| Douglas-fir | PSME | | | | | | 20 | 3.4 |
| median | 95 | 0 | 0 | 0 | 0 | 0 | | |
| mean | 101 | 11 | 36 | 1 | 5 | 1 | | |
| range | 0-364 | 0-60 | 0-163 | 0-16 | 0-30 | 0-12 | | |
| Western Hemlock | TSHE | | | | | | 30 | 3.6 |
| median | 33 | 16 | 0 | 8 | 0 | 0 | | |
| mean | 63 | 18 | 16 | 12 | 5 | 5 | | |
| range | 0-236 | 0-82 | 0-132 | -51 | 0-36 | 0-48 | | |

Extensive grazing over the last 100 years has influenced and affected wet and dry meadow habitats distributed throughout the watershed. Species composition and abundance has changed with intensive grazing moving the historical vegetation communities from native composition to one which now clearly exhibits a mixture of recently introduced exotic plants.

## WILDLIFE HABITAT

The basis for establishing or comparing historic wildlife habitat conditions within the Forks Watershed is the Jackson and Klamath County stand type maps of 1947 & 1949 and the Current Condition Class map layer (available at the District within the Geographic Information System). This assessment assumes vegetation data from 1947 and 1949 provides an accurate account of the forest prior to Euro-American settlement and management by the federal agencies or private land owners.

### Historical Habitat Conditions

Four habitat types were chosen from the 1947/49 county mapping to portray vegetation conditions prevalent in the watershed. The categories are, Old-Growth/Late-Successional, Mid-Seral/Mid-Successional, Transition Early-Seral/ Early-Successional and Early-Seral/Early-Successional (Table 5). Approximately 74 percent of the forested area was in stand conditions classified as Old-growth/Late-Successional stands. This category represents the broad spectrum of tree species and habitat conditions found within the Forks watershed. The Mid-Seral/Successional category covers 9,548 acres, the Transition Early-Seral/Successional 8.5 acres, and the final category is represented by 19,533 acres of Early-Seral/Successional stand conditions. See Map 16 for a comparison of seral stages.

**Table 5. Historical Condition of Terrestrial Habitat.**

| 1947/49 Map Code | Vegetation Type | Acres |
|---|---|---|
| | *Old-Growth/Late-Successional* | |
| 6 | Douglas-fir > 32"dbh | 27,300 |
| 20 | Ponderosa Pine > 22"dbh | 2,526 |
| 23 | True fir >16"dbh | 34,539 |
| 29 | White fir > 16"dbh | 11,544 |
| 25 | Lodgepole Pine > 12"dbh | 98 |
| 33 | Subalpine fir | 7,795 |
| | *Mid-Seral/Successional* | |
| 9a | Douglas-fir large poles 16-20"dbh | 302 |
| 21 | Ponderosa Pine < 20"dbh | 2,526 |
| 24 | True fir < 10"dbh | 34,539 |
| 30 | White fir < 14"dbh | 423 |
| 26 | Lodgepole Pine < 10"dbh | 3,014 |
| 27s | Mixed Forest > 12"dbh | 118 |
| 38 | Non-Commercial Forest Area | 149 |
| | *Transition Early Seral/Successional* | |
| 9b | Douglas-fir pole 6-14"dbh | 80 |
| 26a | Lodgepole Pine < 6"dbh | 0.5 |
| | *Early Seral/Successional* | |
| 10 | Plantations | 3,539 |
| 37 | Deforested Burns | 8,454 |
| 2 | Grass, Sage | 7,540 |

The 1947/49 forest stand typing paints a picture of a watershed with a great deal of late-succesional habitat dominated by two forest types; the Douglas-fir at 27,300 acres (33%), and True Fir at 34,539 acres (41%). This late-successional condition was probably the most critical habitat type for supporting the type of species found in the watershed. Table 6 and 7 describe habitat conditions for several late-successional dependent species that occupy or may have occupied the watershed in the past.

Northern Spotted Owl Habitat and Population: Suitable spotted owl habitat and dispersal habitat made up approximately 67% of the forested stands within the watershed (Table ). Up to nine pairs of northern spotted owls could have occupied the watershed, assuming 8,000 acres of suitable habitat per pair. Late-successional habitat conditions provide the best nesting, roosting and foraging opportunities. Using habitat viability standards today, the situation would look quite different. If 1,842 acres of suitable owl habitat existed per owl pair (minimum viability for a 1.2 mile home range radius), then up to 40 owl pairs could have been present in the watershed. This estimate is probably unrealistic because of many other factors that contribute to spotted owls occupying and using suitable habitat.

**Table 6. Historical and Current Suitable Spotted Owl Habitat.**

| Habitat Classification | 1947/49 Habitat Conditions (acres) | Condition Class Habitat Condition (acres) |
|---|---|---|
| Suitable Spotted Owl Habitat (SOH) | 73,383 | 30,697 |
| Dispersal Spotted Owl Habitat (D) | 1,969 | 44,113 |
| Capable Spotted Owl Habitat (C) | 14,112 | 54,216 |
| Non-Owl Habitat (NF) | 23,499 | 1,130 |
| TOTAL | 112,963 | 130,156 |

Great Gray Owl Habitat: Prior to 1947, approximately 81,276 acres of nesting habitat, 7,540 acres of optimal foraging habitat, and 11,993 acres of foraging habitat was available for the great gray owl. Information does not exist which would allow a population estimate for this species.

**Table 7. Great Gray Owl Habitat.**

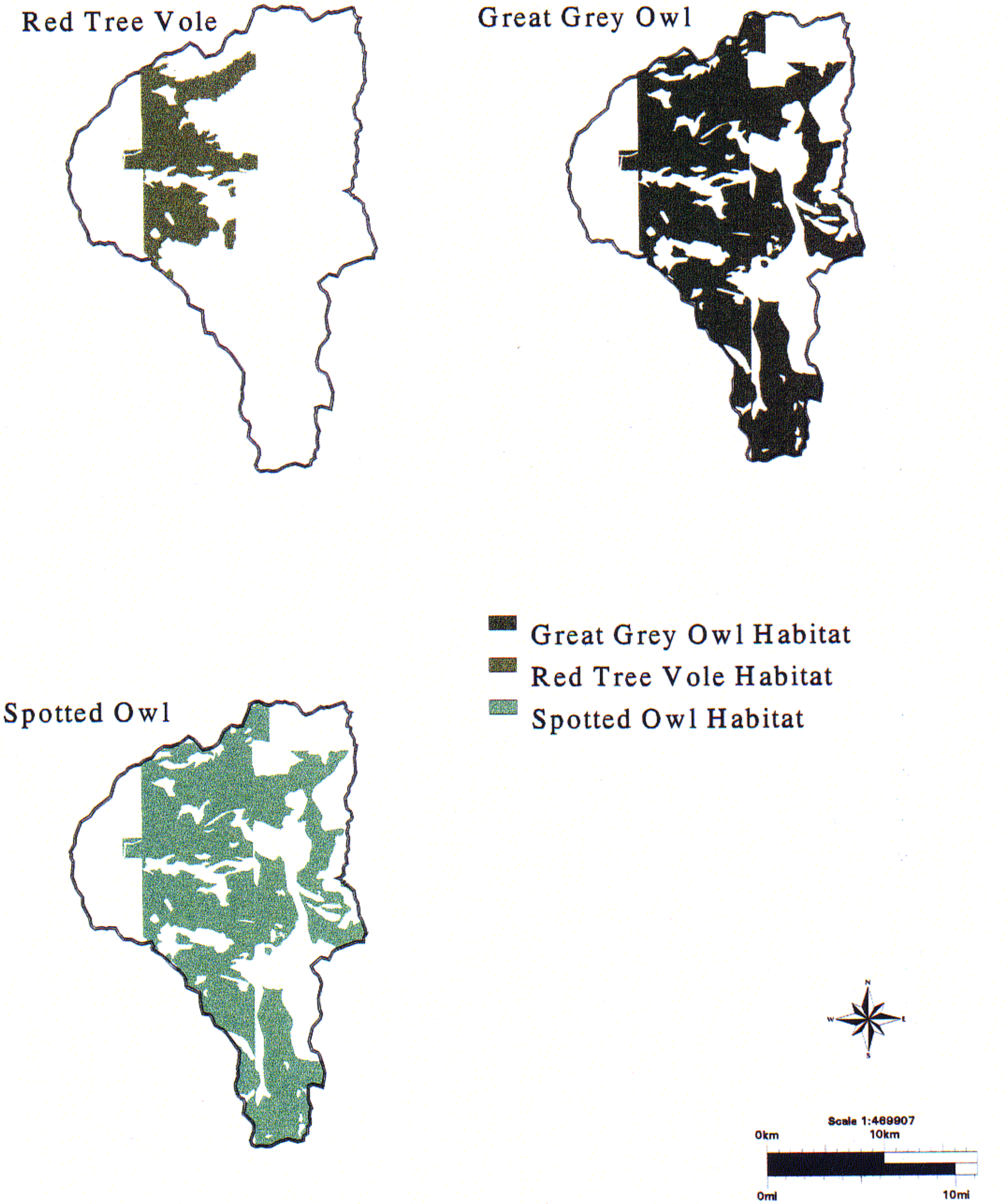
| Habitat Condition | Vegetation Analysis using Condition Class | 1947/49 Habitat Condition (acres) | Condition Class Habitat Condition (acres) |
|---|---|---|---|
| Nesting | OG = Old-Growth<br>MH = Mature Habitat<br>MM = Mature | 50,342<br>23,041<br>7,893 | 2,373<br>30,964<br>42,234 |
| Optimal Foraging | RL = Seedling low stocking<br>RR = Meadow | 0<br>7,540 | 274<br>1,602 |
| Foraging | RO = Seedlings, satisfactory (0-4.5" tall)<br>NS = Non-stock | 0<br>8,454 | 8,372<br>4,427 |
| Marginal Forage | SH = Shelterwood<br>SO = Saplings (avg. 4.5" tall & 4.9 dbh) | 0<br>0 | 4,984<br>3,161 |

Red Tree Vole Habitat: During 1947/49, approximately 27,720 acres (25%) of forest stands supplied potential suitable habitat for the red tree vole habitat within the Forks Watershed. Prior to the 1910 fire, there appeared to be 39,713 acres of potential habitat, but the 1910 South Fork fire was salvage logging which reduced about 11,993 acres of low elevation Douglas-fir forests. Map 17 shows the location of historical habitats for the above sensitive species.

Special Habitats: Rock outcrops, vernal seeps and springs, and wet marshy sites were prevalent throughout the watershed. However, little information exists to verify the condition of these resources. It is thought that these habitats were in optimal condition.

# South Fork & Middle Fork Watershed Historical Habitat Types

MAP 17



## Current Habitat Conditions

The same four habitat groupings described above were used to describe current vegetation condition. Approximately 26% of the forested area exhibits stand conditions which can be classified as Old-growth/Late-Successional stands. This category is interpreted from the Douglas-fir and Shasta red fir communities. The Mid-Seral/Successional category covers approximately 53%, the Transition Early-Seral/Successional covers approximately 8%, and the Early-Seral/Successional stand category represents about 9% of the watershed (Table 8).

**Table 8. Current Condition of Terrestrial Habitat.**

| Condition Class Code | Vegetation Type | Acres |
|---|---|---|
| | ***Old-Growth/Late-Successional*** | |
| OG | Old -growth | 2,373 |
| MH | Mature Habitat | 30,964 |
| | ***Mid-Seral/Successional*** | |
| MM | Mature Stand | 42,234 |
| MT | Mature Thinning Opportunity | 15,151 |
| MN | Mature, No-Thinning Opportunity | 10,698 |
| | ***Transition Early Seral/Successional*** | |
| PT | Poles, Thinning Opportunity | 941 |
| PN | Poles, No Thinning Opportunity | 3,877 |
| SH | Shelterwood | 4,984 |
| | ***Early Seral/Successional*** | |
| RO | Seedling, Satisfactory Stocking | 8,372 |
| RL | Seedling, Low Stocking | 274 |
| SO | Sapling, Satisfactory Stocking | 3,161 |
| SL | Sapling, Low Stocking | 139 |
| | ***Non-Forest*** | |
| NF | Non-Forest (Rock, Dry Grass etc.) | 4,427 |
| RR | Range | 1,602 |
| WW | Water (may include riparian veg) | 682 |

The forest stand typing portrays a watershed which has about one-third of the historical late-successional habitat. Early-seral/successional has low to moderate coverage (19,533 acres/ 17%) in the watershed. Forest plantation represent 9% (11,946 acs.) of the early seral conditions found in the watershed. No fire affected stands were noted in the 1989 data set.

The northern spotted owl (*Strix occidentalis caurina*), great gray owl (*Strix nebulosa*) and red tree vole (*Arborimus longicaudus*) depend on late-successional stand conditions to maintain viability in the ecosystem. The Northwest Forest Plan (1994) directs the specific habitat management for these and many other species.

The northern spotted owl has good dispersal capability if certain stand conditions are available throughout the landscape. Habitat conditions which provide dispersal for the northern spotted owl are stands which contain at least 40% canopy cover and have an average tree diameter of 11 inches, and the understory must be open enough for an owl to disperse through. The great gray owl has the ability to disperse over a fairly wide area, but usually stays in proximity to natal unit (a female and nest site). Some anecdotal information is available on juvenile great gray owl dispersal in southwest Oregon. The red tree vole is generally considered to have poor dispersal capabilities, recent research (Brian Bisswel, PNW 1998) tried to highlight the red tree voles dispersal capabilities, limits and mechanisms in southwestern Oregon. Fragmentation of habitat conditions is an issue which affects a number of species and their ability to disperse and remain viable in the ecosystem.

Northern Spotted Owl Habitat and Population: Sixteen spotted owl pairs and 5 territorial singles occur within the watershed. Eight of the spotted owl pairs have greater than 40% suitable owl habitat within their home range (1.2 mile radius). The remaining 8 owl pairs and 5 territorial singles have less than 40%, and over half of this group have less than 30% available habitat within their home ranges. Over the short term, the viability of these sites is in question. All spotted owl activity centers are located within the Late-Successional Reserve established by the Northwest Forest Plan. Habitat conditions in the watershed are expected to increase and the viability of the nest sites and activity centers should increase over time. Currently, 55% of the watershed has late-successional stand conditions. Critical Habitat Unit OR-35 overlays the watershed and follows the same boundary as the Middle Fork LSR, but has minor variations along several of the watershed boundaries.

Great Gray Owl Habitat: There are approximately 75,571 acres of nesting habitat available within the Forks Watershed Area. These acres are derived from a simulation of vegetation types that have been reported to be used by great gray owls. Foraging habitats are separated into three categories; optimal foraging, foraging, and marginal foraging habitat conditions. Within the watershed, optimal foraging habitat covers 1,876 acres, foraging habitat 12,799 acres and marginal foraging habitat 8,145 acres

Red Tree Vole Habitat: There are approximately 64,126 acres of suitable red tree vole habitat within the Forks Watershed (Table 9). A habitat assessment was based on the criteria described in the draft Red Tree Vole Protocol. The red tree vole habitat assessment indicates that 19,784 acres of potential red tree vole habitat is available in the watershed This amount of red tree vole habitat exceeds all the criteria for triggering the need for site specific surveys on ground disturbing projects.

**Table 9a. Habitat Condition for Red Tree Vole.**

| Habitat Condition | Vegetation Analysis using Condition Class | Acres |
|---|---|---|
| Suitable | OG = Old-growth<br>MH = Mature Habitat<br>MM = Mature<br>MT = Mature Thinning | 2,311<br>30,439<br>20,938<br>10,383 |
| Total | | 64,126 |

**Table 9b. Red Tree Vole Habitat Availability.**

| Forks 5th Field Watershed | | | | | |
|---|---|---|---|---|---|
| 5th Field Identifier | Total 5th Field Acres | Total 5th Field FS Acres | 5th Field FS Acres below 4300' | 5th Field Suitable RTV acres below 4300' | Habitat Threshold Condition (> or< 40%) |
| 02 | 114,326 | 112,247 | 34,430 | 19,784 | >40% (57%) |
| The threshold determining survey and management requirements for the red tree vole is: a minimum of 40% of the federal land in the fifth-field watershed is forested and (a) has approximately 60 percent crown closure or greater, and (b) has an average conifer tree diameter at breast height (DBH) of approximately 10 inches or greater, and © this closure and diameter can be maintained through the end of the decade (year 2000) | | | | | |

Map 18 shows the location of the current habitat conditions for the above species.

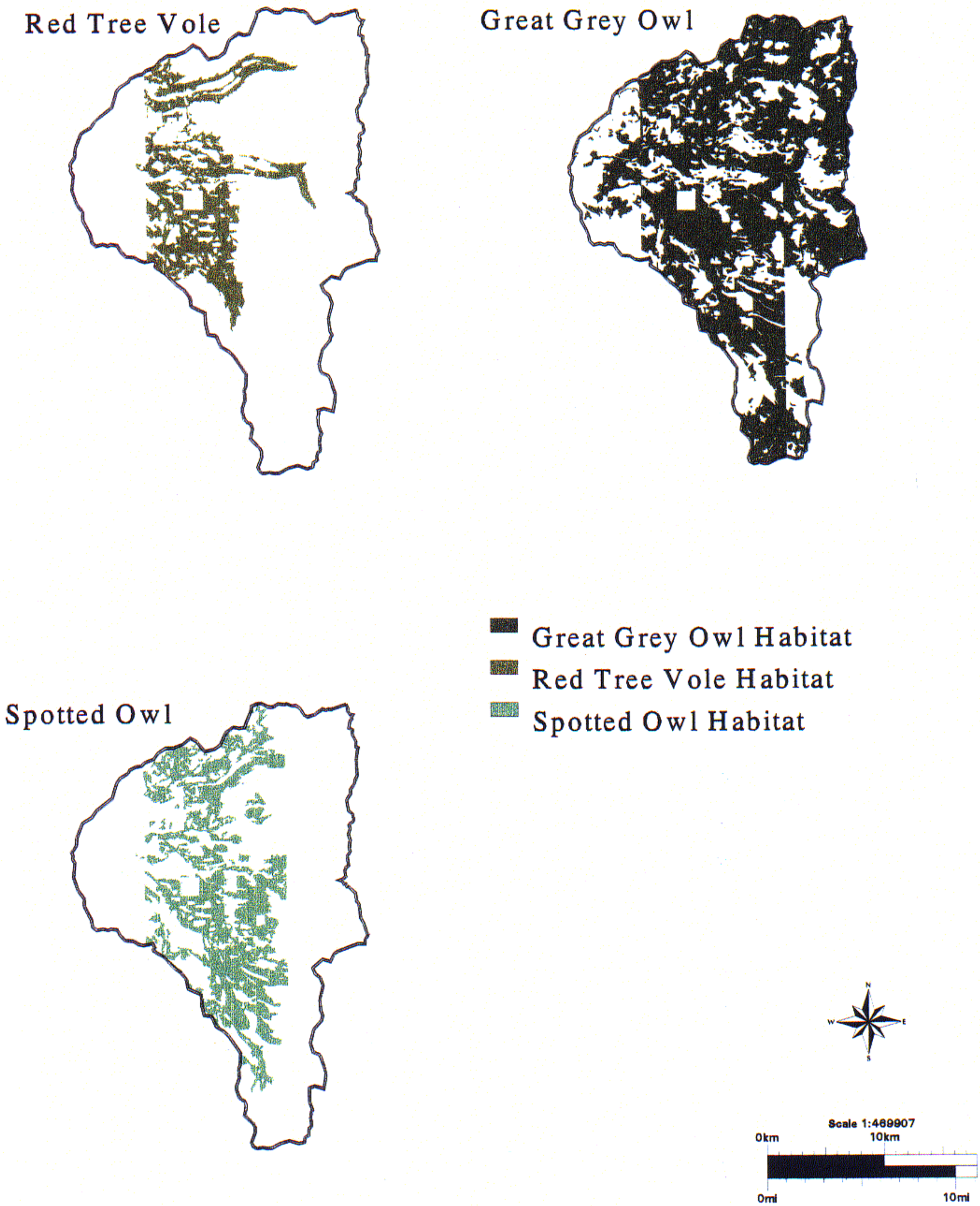
Special Habitats: Special habitat conditions cover those species which are closely associated with rock outcrops and talus areas, (peregrine falcon, yellow-bellied marmot, California wolverine, pika) species associated with wet marshy areas, (sandhill cranes) and species which depend on standing dead and down tree habitat (fisher, pine marten, woodpecker).

Several cliff sites exist within the Forks Watershed which may be occupied by peregrine falcons. Three of the potential sites are located within the Sky Lakes Wilderness and Crater Lake National Park; the forth site is near Bessie Rock.

Rock talus habitat can be readily found within Sky Lakes Wilderness and Crater Lake National Park. No recent marmot sightings have occurred, however pika (rock rabbit) have been observed at three locations within the Sky Lakes Wilderness and at several other locations within the watershed.

MAP 18

# *South Fork & Middle Fork Watershed Current Habitat Types*

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Several marshy areas are located within the watershed. One area has sandhill crane activity and an assessment of this site should be covered in the Bureau of Land Management's Lost Creek Watershed Analysis.

Many wildlife species are closely associated with or have a considerable portion of there life history linked to standing dead and down tree habitat. The South Cascades Late-Successional Reserve Assessment (1998), using Southwest Oregon ecoplot data, indicates the Middle Fork LSR (#RO 226) is in the Western Hemlock and White fir series. Small portions of the watershed, mainly at the higher elevations along the wilderness and park boundaries, are in the Shasta red fir and mountain hemlock series. Within the South Cascades Assessment, Table 27 and Table 28 describe standing dead and down habitat components within the LSR. Generally, the pieces per acre of logs range from 12 pieces/acre (Mt. Hemlock) to 42 pieces/acre (W. Hemlock) and the standing snags range from 0 snags/acre (all plant series) to 22 snags/acre (Shasta-red fir) greater than the 16" diameter category.

Evaluating this habitat from a broad perspective, many forest activities occurring in the Forks watershed have an impact on this important resource component. Forest activities such as personal use firewood cutting are benign in that very little habitat is affected at any one point in time, but cumulatively they can have a tremendous impact. Other activities, such as timber harvest, roadside hazard tree removal, commercial firewood cutting, and slash abatement projects have a more immediate impact to this resource.

Early Seral Habitat: Approximately 11,946 acres of early seral forest stands exists within the watershed. These early seral stands represent 10% of the vegetation component of the watershed. Development of this habitat condition indicates the level of timber management that has occurred and the emphasis on big game management that has creating forage areas increasing the amount of forage available for big game like blacktail deer and Roosevelt elk. The pattern imprinted on the landscape is an alternate leave block design, which correlates with the type of fragmentation observed on the landscape.

**Table 10. Forks Watershed Big Game Habitat.**

| Habitat Code | Type of Habitat | Acres within Winter Range Strategy (MA 14) | RRNF LMP Plan Standards (%) | Forks Watershed Current Condition (%) |
|---|---|---|---|---|
| F | Forage | 5,064 | 20 - 50 | 35 |
| CH | Cover, Hiding | not classified | NA | NA |
| CO | Cover, Optimal Thermal | 3,389 | 30 | 23 |
| CT | Cover, Thermal | 6,166 | 30 | 42 |
| Total | | 14,617 | 100 | 100 |

## HABITAT CONNECTIVITY

Prior to 1947/49, forest fragmentation was very subtle on its impact to species within the Forks Watershed. Natural barriers such as rock outcrops, canyons, ridges, thermal changes and elevation were the conditions most species encountered. Much of the current road system did not exist in the watershed at that time. Today, fragmentation across the watershed is a serious problem in terms of maintaining species habitat viability.

Fragmentation of late-successional forest or lack of connectivity between or amongst late-successional patches is becoming an issue in project, watershed, and provincial scales (Mellen 1997). Viability of species and how connectivity might play an integral role is at the heart of many discussions being conducted in northwest forests. Connectivity as described by Mellen (1997) "incorporates information and knowledge from landscape ecology, population dynamics, habitat relationships, and island bio-geography. The basic principle is that habitat islands (patches) across the landscape need to be linked in some way so that species can move between them". The movement of animal species can be categorized into three types; daily movements within the home range, dispersal, or migration (Mellen 1997, Forman and Godron 1986). These three movement patterns vary based on season , species or even within species. Movement of dispersing individuals across the landscape, whether it be at the stand, forest, watershed or provincial scale provide the mechanism for genetic material exchange and longevity of the species. The Habitat Conservation Strategy (USDA 1990) and the Northwest Forest Plan (USDA 1994) incorporate many of the principles of island bio-geography. Mellen (1997) points out in her work on connectivity that there is a major difference from oceanic islands and isolated patches. She infers that in a "fragmented landscape that intervening lands (matrix) are usually not as hospitable to species as the ocean. Dispersal success will be higher if islands are closer together and the intervening lands are more hospitable". Mellen also indicates that fragmentation can provide the life support for species if habitat patches are not large enough to support self-sustaining populations.

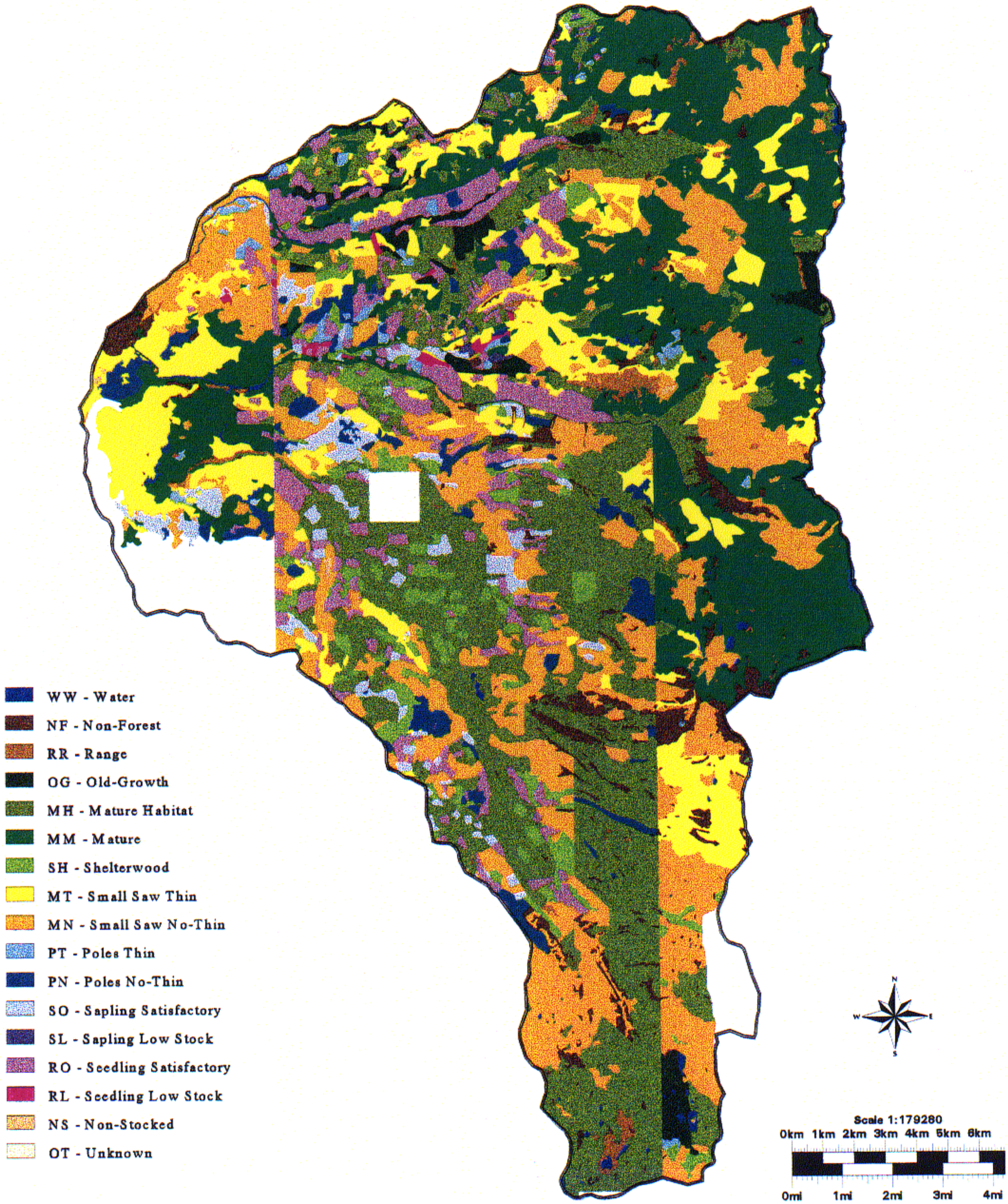
In the context of the Forks Watershed, most of the land is in a large habitat block (LSR). However, within portions of the LSR, only 55% of the stand conditions represent late-successional habitat. Fragmentation is not only seen between patches, but also between forest stands. Elevations range from 2,500 feet up to 7,100 feet and subsequently at the lower elevations, there is a progression in the forest cover type from ponderosa pine oak-woodland to high elevation white pine, lodgepole pine and mountain hemlock. At the higher elevations, all streams originate on the eastern edge of the watershed and flow down slope to the west. Add to these natural barriers the affect on species migration: open forest roads (approximately 294 miles/3.36 miles per square mile), recreational facilities (5) and power plant generation units (2), and one can see that species with restricted migration mechanisms (salamanders, red tree vole) have difficulty moving throughout the watershed.

Map 19 illustrates the current extent of the fragmentation in the watershed. Comparing the 47/49 map with the current condition, it appears that there is a fragmented landscape in the Forks Watershed. The satellite imagery map (Map 15) supports the PMR and Current Condition vegetation classification with the conclusion that the watershed has become more fragmented. Forest fragmentation is also developed by the effects of elevation, natural barriers and human-created barriers on the ability of a given species to use and move through a landscape.

# South Fork & Middle Fork Watershed

MAP 19

## Condition Classes



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Based on Mellens work, it appears that fragmentation may not be as inhospitable as described. However, given that fragmentation is influenced by several factors, it is likely that species with limited mobility are affected by current conditions in the Forks Watershed.

Fire effects on stand development, as well as insect and disease out-breaks, greatly influence the structure and composition of our forests. Fire exclusion has lead to an increase in shade tolerant species and contributed to the influence of insect/disease patterns seen today. The fuel composition has shifted across the forest floor with more of the coarse wood component being supplied by the smaller diameter ranges (Table 4). The South Cascades LSR Assessment (1998) indicates that the coarse wood component was historically composed of larger sized material. Past management practices and fire exclusion have probably contributed to this change.

Extensive grazing over the last 100 years has influenced and affected wet and dry meadow habitats distributed throughout the watershed. Species composition and abundance have changed with intensive grazing, which has moved vegetation communities dominated by species of native composition, to communities showing competition In addition, current vegetatiion clearly exhibiting a mixture of recently introduced exotic plants.

## WILDLIFE SPECIES IN THE WATERSHED

### Historical Populations

Historical based scientific collecting parties (Gabrielson, et. al. 1970), trapper reports, forest visitors, hunters, and Forest Service personnel indicate many of the upper trophic level species (wolf, grizzly bear, etc.) were prevalent at some level within or near the watershed. Young and Goldman (1944) indicate that approximately 5 gray wolves (1939) existed within the Rogue River National Forest. Jewett (Young 1944) indicates the wolf is holding its own in the Cascade range of Oregon, but fellow biologist Robert Rowe indicates a downward trend in his assessment. It is felt by most experts that by the 1940s the gray wolf was either extinct of becoming extremely rare within the state. Game and varmint species are of great interest to many forest visitors. Rocky Mountain elk were brought in from Wyoming in the early 1900's to develop a huntable population within the Cascade Forest Reserve. In 1926, the Oregon Department of Fish and Wildlife reported 16 elk, 3,645 blacktail deer and 320 black bear (Brown 1960) within the Cascade Forest Reserve. Information on wildlife populations from year to year are not available because the data was either not collected or was reported in a different format. However, anecdotal information does provide insight into why certain species may have increased or decreased within the area.

### Current Populations

Today, the wolf and grizzly bear are no longer part of the ecosystem in southwest Oregon, varmints are still pursued but not with the same intensity or objective. Game species, especially blacktail deer and elk, are increasing in sport hunting popularity. The Oregon Department of Fish and Wildlife is trying to maintain bench mark populations for blacktail deer (24,500) and elk (3,000 to 3,500) across the Rogue Hunting Unit which includes the Cascade portion of the Rogue River National Forest and the Forks Watershed.

## AQUATIC SYSTEMS

### Streamflow

Streamflow is an important factor in the shape of stream channels. It also has ecological importance because of the influence of streamflow patterns on organisms (Gordon et al. 1992). For example, floods and droughts can have significant impacts on riverine species. Periodic scouring of streambanks and inundation of floodplains regulate plant growth and nutrient input to the stream. The patterns of flooding affect the distribution of plant species both within the stream and along a gradient from the river's edge to upland areas. During low flows, temperature and salinity levels rise, and plant growth within the channel can increase. Some species rely on low-flow periods for a part of their life history; for others, it is a time of stress.

Intermittent streams, which dry up completely for periods of time, experience a greater range of physical and chemical variation (e.g., in temperature and dissolved oxygen levels), and therefore support unique biological communities.

### Timing and Distribution of Streamflow

Geology, soil type, vegetation, and climatic patterns affect the timing and distribution of flow in streams.

Human activities affecting the timing and distribution of flow in the Forks Watershed Analysis area include land-use changes and channel modifications. Land-use changes impact streams by affecting runoff rates and the input rates of sediment, woody debris and chemical pollutants. Clearing land for urbanization, agriculture or timber harvest has been determined to increase the recurrence of flood intervals, the size of floods, as well as the timing - meaning higher peak flows (Hollis 1975). Channel modifications have had more direct impacts on streams. The impacts can occur not only in the modified reach but also in upstream and downstream sections. Channel modifications include; road construction and maintenance, water impoundments, water withdrawals, instream wood removal, and livestock impacts. [1]

### Climatic Patterns

The climate of the area is characterized by cool moist winters and warm dry summers. This pattern can be seen in Figure A of the Hydrology Appendix which shows the 30 year precipitation and temperature averages for Prospect, which is north and west of the watershed analysis area. During the winter months the general southward displacement of the Aleutian low pressure system results in a predominantly westerly flow of moist air from the Pacific Ocean. The area is subject to frequent winter storms of varied intensities. Winter precipitation in the higher elevations generally occurs as snow, with rain occurring in the lower elevations. During summer months, the area is dominated by the Pacific high pressure system which produces hot, dry

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[1] For descriptions of the historic influence of human activity on the flow regime within the Forks Watershed Analysis Area, please refer to Appendix B which contains the Rogue River National Forest report, "Environmental History of the "Forks" Watershed Analysis Area," written by Jeff LaLande, June 1997.

summers. Summer rainstorms occur occasionally and are usually of short duration and limited in coverage area. Annual average precipitation varies by location within the watershed. Expected annual precipitation varies between 45 and 65 inches. Most of this occurs during the months of October to March. Figure B of the Hydrology Appendix depicts average annual precipitation within the analysis area. Figure C (Hydrology Appendix )shows how this amount of precipitation relates to the state of Oregon.

## Hydrology

Records from seven different U.S. Geological Survey stream gaging stations exist within the Forks analysis area. Only one of these, South Fork Rogue River near Prospect, is currently operating. The rest have been discontinued. Table A in the Hydrology Appendix shows runoff information from these stations.

Runoff is a response to precipitation. In this area, runoff does not parallel precipitation patterns. Whereas precipitation peaks during the months of November to January, runoff peaks in March to June in response to snowmelt from the higher elevations. Runoff rises in the fall in response to the annual increase in precipitation. As the precipitation changes to snow during the winter months, runoff levels off. The annual peak in runoff occurs in late spring as the snowpack begins to melt. Once the snow is gone, runoff drops off to the levels experienced in the summer when streamflows are generally at their lowest. Figure D (Hydrology Appendix )depicts the precipitation-runoff relationship for the analysis area. Figure E (Hydrology Appendix )shows monthly discharge for four streams within the analysis area. Although the scale is different for each of the stations, the pattern of runoff is similar.

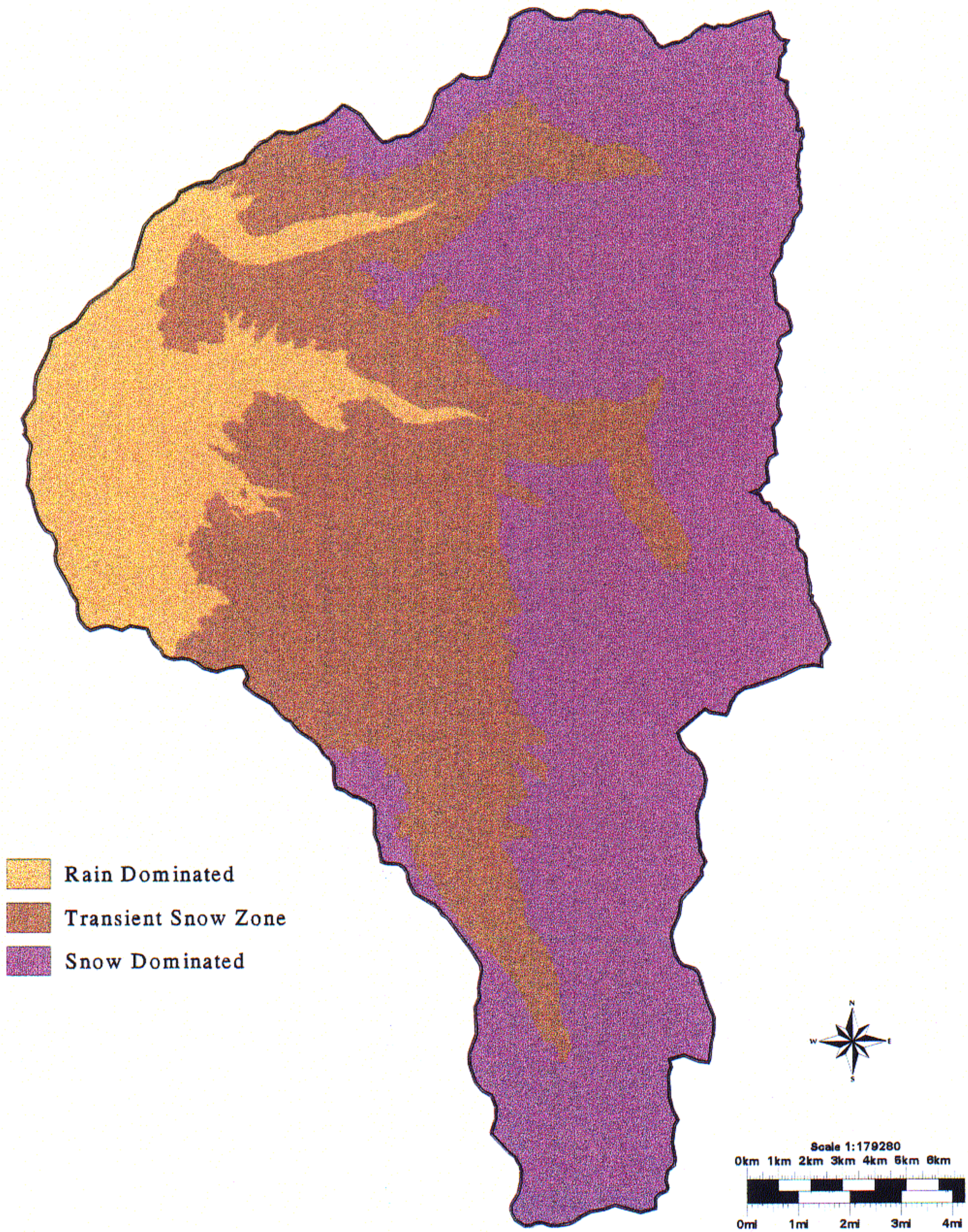
Although the annual runoff peak generally occurs in late spring in response to snowmelt, the record peak flow occurred in December 1964 in response to a rain-on-snow event. The estimated peak flow in the South Fork Rogue in 1964 was 28,500 cubic feet per second. This compares to the average flow of 404 cubic feet per second.

Maximum peak flows, resulting from rain-on-snow events within the transient snow zone are flashy and relatively unpredictable. The January 1997 storm is a good example of the flashy nature of a rain-on-snow event. During this event, the Little Butte Creek drainage, located south of the analysis area, experienced hundreds of thousands of dollars worth of flood damage as a result of the flashy nature of the storm. Because of this, it is important to recognize where and to what extent the transient snow zone affects the Forks analysis area. The transient snow zone within the Forks Watershed (see Map 20), occurs in the elevation band between 3,500-5,000 feet, covering approximately 35% of the area. Approximately 51% of the area lies above 5,000 feet where precipitation generally falls as snow and 14% lies below 3,500 feet where rain is the dominant type of precipitation.

MAP 20

# South Fork & Middle Fork Watershed

## Transient Snow Zone



The following table illustrates the percent, by precipitation pattern, in each sixth field watershed:

**Table 11. Percent of Dominant Precipitation Patterns by Sixth Field Watershed.**

| Sixth Field Watershed | Precipitation Pattern | Percentage of Sixth Field Watershed |
|---|---|---|
| Rogue River S Fork, Upper | Transient snow zone<br>Snow dominated zone | 25<br>75 |
| Big Ben Creek | Transient snow zone<br>Snow dominated zone | 20<br>80 |
| Imnaha Creek | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | .5<br>57.5<br>42 |
| Rogue S Fork - Lodgepole | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | 42<br>56<br>2 |
| Rogue River Middle Fork Upper | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | 6<br>27<br>67 |
| Bessie Creek | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | 5<br>43<br>52 |
| Red Blanket Creek | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | 14<br>26<br>60 |
| Rogue Middle Fork Lower | Rain dominated zone<br>Transient snow zone<br>Snow dominated zone | 58<br>41<br>1 |

### Stream Network/Pattern

The density of a stream network reflects the climate patterns, geology, soil types, and vegetation cover within a watershed. The dominant stream patterns in the watershed analysis area are characterized as trellis, parallel, and dendritic. Based on map and aerial photo analysis, the stream density appears to be the greatest in the Middle Fork of the Rogue River, as well as the sixth field watersheds of Bessie and Red Blanket Creeks. At the higher elevations of the analysis area, wetlands and lakes dominate the landscape. The highly fractured nature of the volcanic deposits slow percolation rates and create numerous springs along the steep mountain slopes (see also Geologic Landscape, Part II).

The stream pattern characterized as parallel generally indicates moderate to steep slopes but can also be found in areas of parallel, elongate landforms such as the mid-elevation, deep U-shaped canyons of the South and Middle Forks of the Rogue River.

The many small tributaries which are essentially the same size, on opposite sides of the mainstem of Red Blanket Creek, suggest it more closely resembles a trellis drainage pattern. A trellis pattern indicates volcanic areas of parallel fractures. Overtime, a trellis pattern stream will transition toward a parallel drainage pattern.

In the upper and lower elevations a more dendritic stream pattern exists, resembling the branches of a spreading oak tree. This pattern is present in the upper reaches of the Middle and South Forks of the Rogue River, Imnaha and Big Bear Creeks. It can also be found in the lower elevations of the Middle Fork of the Rogue River. A dendritic pattern generally indicates more gentle regional slopes and uniformly resistant rock types.

Intermittent channels are the dominant stream type in the watershed analysis area. These channels are generally located in the upper third of the stream network collecting ground and spring water and influencing the energy and storage capacity for channels downstream. These channels also function as surface water collection networks during large storm events.

### Lakes

There are a number of small lakes in the headwaters of the watershed analysis area. The lakes within the Sky Lakes Wilderness are of glacial origin. Studies into the water quality of these lakes has been ongoing for several years. The lakes are of uniformly high quality. Several have caught the attention of researchers due to their exceptional quality. Alta Lake stands out among these, due to its chemical purity and low buffering capacity. It has been compared to "rain-water like" quality.

The investigations into the quality of these lakes have produced a great deal of information. The studies indicate that all of the lakes are classified as either ultra oligotrophic or oligotrophic. Lakes thus classified are very low in nutrients and support lower levels of life than those that are relatively richer in nutrients. In a natural progression in the life of a lake, it would begin as oligotrophic and progress to mesotrophic as it gained in nutrients from runoff and rainfall. The lake would then progress to eutrophic and finally turn into a meadow. Eutrophic lakes have high nutrient levels and abundant plant life.

Within the Sky Lakes Wilderness, there are no lakes classified as eutrophic, but some are classified as mesotrophic. At least one lake (e.g., Meadow Lake in the Blue Canyon Basin of the South Fork of the Rogue River) has progressed through eutrophic conditions and is becoming a meadow. The chemical and physical properties of the lakes has been well-documented by Salinas (1994). Readers interested in these properties are referred to his reports.

It should also be mentioned that because the soils around these lakes have a low buffer capacity, a potential exists for acid-prone runoff. For further information on this subject please refer to the Soil and Landform discussion, Part II of this report.

### Land-use Changes and Channel Modifications

The primary change in land-use patterns affecting the watershed ares the removal of vegetation for timber harvest, agriculture, or natural processes including fire and disease. The removal of vegetation has the potential to change the magnitude and timing of flow as a result of altered interception and soil moisture utilization.

Channel modifications have more direct impacts on streams and include water withdrawals, water impoundments, roads, and livestock impacts. The impacts can occur not only in the modified reach but also in upstream and downstream sections.

Roads are the major human impact on the forest environment within this watershed analysis area. The effects of roads on hydrologic functions and resultant water quality are well documented in the literature. Many factors determine a road's influence on groundwater interception, runoff distribution over time and space, and potential for sediment production and delivery to streams.

Impacts from roads basically fall into three areas: introduced sediment into streams; snowmelt re-direction and concentration; and surface flow production (Johnson 1995).

### Snowmelt Re-direction and Concentration

Roads are basically a horizontal feature in a landscape driven by vertical, gravity driven processes. Spring snowmelt and runoff from our frequent mid-winter melt and rain-on-snow events that would normally travel in a downhill direction, usually as shallow sub-surface flow, is intercepted by the compacted roads and their ditches and becomes surface flow. By doing this they are, in effect, dramatically increasing the drainage efficiency of a watershed. Increasing the drainage efficiency of a watershed concentrates flow, resulting in higher peaks.

Drainage-way crossings, quicken the response time of water delivery to the channel (see Map 21). This quickened response time causes streams to increase flow more quickly during winter storms (particularly during rain-on-snow events) and tend to make intermittent streams "flashy" during intense summer thunderstorms. Drainage-ways crossed in fish-bearing stream segments, while low in number, have the potential to prohibit fish migration and increase fragmentation.

# South Fork & Middle Fork Watershed

MAP 21

## Drainage-way Crossings

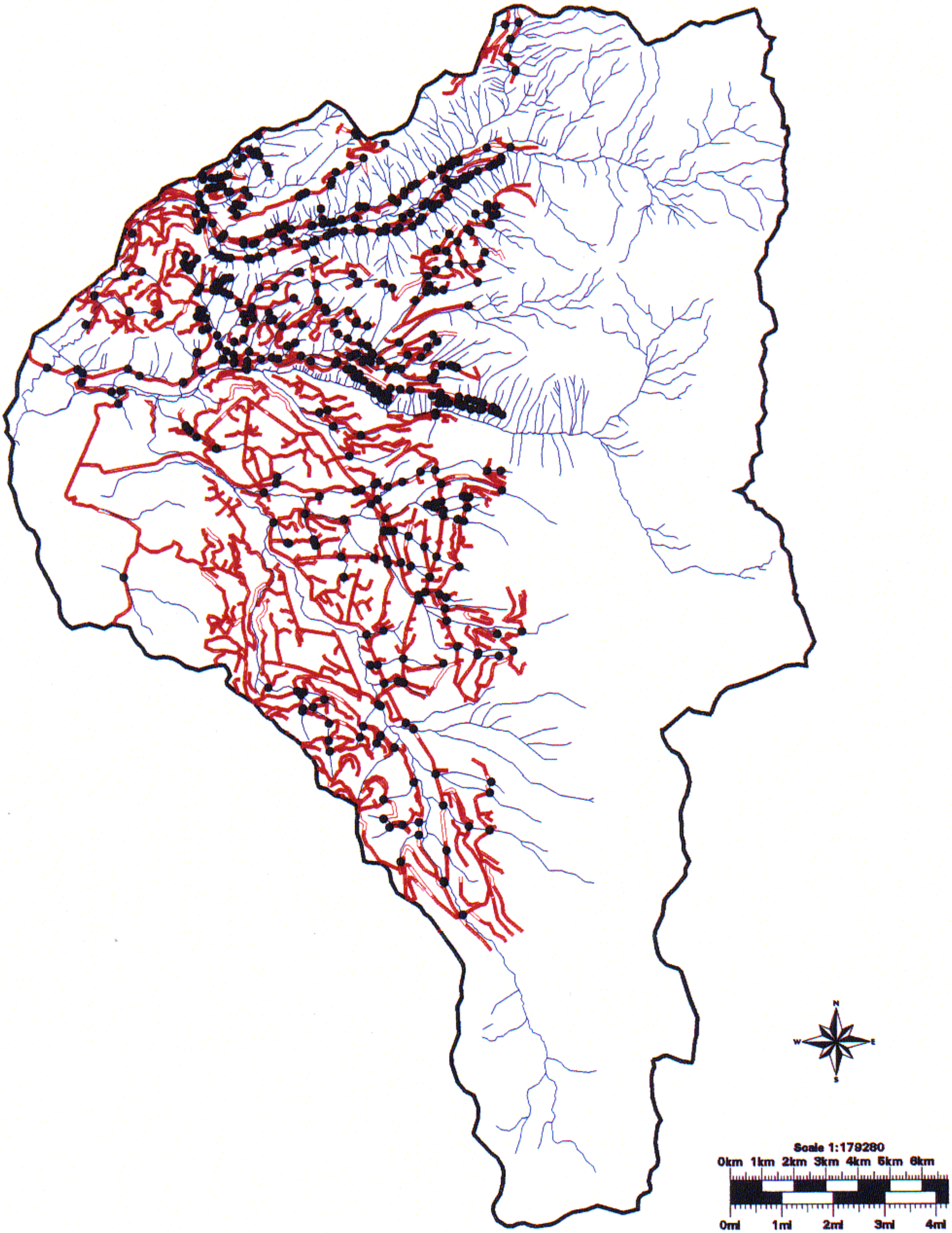



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**Table 12. Drainage-ways Crossed in Stream Segments by Sixth Field Watershed.**

| Sixth Field Watershed | Fish or Non-fish bearing | Number of Crossings |
|---|---|---|
| Rogue River S Fork, Upper | Fish-bearing | 6 |
| | Non-fish bearing | 90 |
| | **Total** | **96** |
| Big Ben Creek | Fish-bearing | 2 |
| | Non-fish bearing | 2 |
| | **Total** | **4** |
| Imnaha Creek | Fish-bearing | 9 |
| | Non-fish bearing | 128 |
| | **Total** | **137** |
| Rogue S Fork - Lodgepole | Fish-bearing | 6 |
| | Non-fish bearing | 136 |
| | **Total** | **142** |
| Rogue River Middle Fork, Upper | Fish-bearing | 12 |
| | Non-fish bearing | 64 |
| | **Total** | **76** |
| Bessie Creek | Fish-bearing | 2 |
| | Non-fish bearing | 71 |
| | **Total** | **73** |
| Red Blanket Creek | Fish-bearing | 28 |
| | Non-fish bearing | 142 |
| | **Total** | **170** |
| Rogue River Middle Fork, Lower | Fish-bearing | 5 |
| | Non-fish bearing | 61 |
| | **Total** | **66** |

### Surface Flow Production

Roads function as surface flowpaths able to channel appreciable volumes of runoff and as an integrated component of the stream network (Wemple 1994). Three types of channels can be identified within all sixth field watersheds of the watershed analysis area (all have been modified by roads): roadside ditches, gullies incised below culvert outlets, and natural streams.

The hillslope position of a road affects both the volume and timing of water delivery to channels (see Table 13). Water contributed to the mainstem channel by a valley-bottom road will be rapidly delivered to the basin outlet, but the volume of runoff contributed by valley-bottom roads may be small relative to runoff volume from roads in other hillslope positions. In contrast, midslope roads may generate greater volumes of surface runoff when subsurface flow is intercepted. Delivery time to the basin outlet, however, is relatively slower than that of valley bottom roads. Ridgetop roads intercept little subsurface flow, but may concentrate sufficient volumes of water to initiate new channels on previously unchanneled hillslopes, resulting in more rapid routing of runoff through the basin (Wemple 1994).

**Table 13. Expected Relationship Between Road Position and Mechanisms for Road Effects on Flow.**

| | Road Position | | |
|---|---|---|---|
| **Mechanism** | **Channel Bottom** (riparian zone) | **Midslope** | **Ridgetop** |
| (1) Intercepting subsurface flow along road cutbanks and routing it along ditches and through culverts to pre-existing or new channel. | Small. Sufficient upslope area to accumulate subsurface flow but effect would be redundant as roads very near existing channel. | Large. Sufficient upslope area to accumulate subsurface flow which if intercepted, is routed to ditch and channel much higher on hillslope than without road. | Small. Insufficient upslope area to accumulate much subsurface flow. |
| (2) Intercepting incoming precipitation and routing it along ditches and through culverts to pre-existing or new channel. | Small. Minimal impact of speeded delivery of intercepted flow to channel due to proximity of road to channel. | Moderate. Delivery of intercepted flow to channel system occurs at faster rates than flow infiltrating undisturbed soils. | Moderate. |
| (3) Incising new channels below some culvert outlets. | Small. Many culverts empty directly into channel or into bank. | Moderate. Ditches and culverts empty into pre-existing first-order or ephemeral channels which already extend up to midslopes. | Large. Concentration of flow by culverts may initiate channels where flowpaths without roads would not. |

(Source: Wemple 1994)

**Table 14. Percent of Roads by Hillslope Position Within Each Sixth Field Watershed.**

| | Road Position | | |
|---|---|---|---|
| **Sixth Field Watershed** | **Channel Bottom** (riparian buffer zone) | **Midslope** | **Ridgetop** |
| Rogue River S Fork, Upper | 78% (21% of total road miles in buffer) | 21% | 1% |
| Big Ben Creek | 100% (29%) | | |
| Imnaha Creek | 76% (22%) | 24% | |
| Rogue River S Fork - Lodgepole | 4% (18%) | 89% | 7% |
| Rogue River Middle Fork, Upper | 97% (20%) | 3% | |
| Bessie Creek | 42% (33%) | 54% | 4% |
| Red Blanket Creek | 60% (36%) | 29% | 11% |
| Rogue Middle Fork, Lower | 27% (20%) | 67% | 6% |

* this table excludes roads on private land outside National Forest boundary

## Other Land-Use Changes and Channel Modifications

Lost Creek Lake Reservoir impounds the waters of the South and Middle Forks of the Rogue River for irrigation and flood control downstream of the analysis area. The Lost Creek dam affects both the hydrology and channel morphology of the South Fork of the Rogue River. The dam imposes an artificial lake environment on the stream and can increase water loss to evaporation and groundwater recharge. The reservoir can be thought of as an effective sediment trap, releasing clearer water downstream. Typically, regulation results in a reduction of peak flows which reduces the ability of the stream to carry sediment (Gordon et al. 1992).

Two primary water diversions exist within the analysis area; one from the South Fork and one from the Middle Fork. Both of these are for generation of power at the Pacific Power Plant on the Rogue River below Prospect. Water diverted from the two forks is carried by canal into a forebay on the main Rogue just below the Prospect Ranger Station. Water is then diverted into a canal and penstock, through the power plant, and back into the Rogue.

Organized fire suppression over the past 100 years within the Forks Watershed has resulted in heavily stocked (dense) stands of vegetation which produce heavier fuel loads (see also Role of Fire, Part II). With these heavier fuel loads comes the risk of increased wildfire severity. Intense, stand replacing wildfire induces similar effects as described above in vegetated stands less than 30 years old. A fire in the steep canyons of the Middle Fork, South Fork or Red Blanket Creek could have devastating effects on water quality, fisheries and soils.

## Fisheries and Aquatic Species

Native salmonid species of the Forks Watershed area of the Upper Rogue River are *Onchorynchus mykiss* (resident rainbow trout), *Onchorynchus clarkii* (cutthroat trout), and the introduced *Salvelinus forntinalis* (eastern brook trout). Brook trout were being introduced throughout the late 1800's into the mid 1900's throughout the Rogue River basin. Another aquatic species which is noteworthy is the tailed frog (*Ascaphus trueii*), which was found in several of the streams surveyed. The tailed frog is listed on the Forest Service Regions Six Sensitive species list.

No threatened or endangered fish species have been reported above Lost Creek Dam. Listed species, coho salmon (*Onchorychus kisutch*) and steelhead trout (*Onchorynchus mykiss*) are only found in subwatershed below Lost Creek Dam. It is highly likely that natural geologic landform barriers near Prospect have existed for thousands of years, precluding anadromous fish presence.

Oregon Department of Fish and Wildlife (ODFW) stocking records date form 1960 for the Sky Lakes Wilderness. Recent records show that sixteen lakes have been stocked with brook trout annually from 1980 through 1985, then in 1987, 1989, 1990, 1991, and 1993 by ODFW. Additional stocking of rainbow trout occurred in Cliff Lake in 1981. No other stocking of rainbow trout is indicated since 1980. ODFW agreed to discontinue stocking Finch, Hemlock, and Holst Lakes in 1985, as per an agreement with the Rogue River National Forest, based on the proposed management of these lakes for pristine values. The others were stocked aerially with brook trout.

ODFW and the Forest Service have conducted periodic fish surveys in the stocked lakes. In 1994, the agencies surveyed the Seven Lakes Basin. Gill netting resulted in no fish caught in either South Lake or North Lake during this effort, but brook trot were netted in the others. Beginning in 1993, Rogue Community College and the Forest Service have cooperatively sampled lakes in the Sky Lakes Wilderness for water chemistry and plankton. The water quality remains exceptionally high in these lakes, especially Alta Lake (see Lakes).

ODFW conducted presence-absence fish inventory study within watershed streams in 1980 (see Appendix H). The greatest percentage of fish they observed were rainbow trout; very few brook trout were observed. The Forest Service conducted Hankin-Reeves Level II stream surveys in 1997. Excerpts and summaries from these surveys are contained in Appendix H. Map 22 portrays fish bearing and non-fish bearing streams within the Forks Watershed.

## WATER QUALITY

The identified beneficial uses for water within the analysis area are stockwatering, hydropower, aesthetics, water-based recreation, and coldwater fishery.

Pursuant to requirements of the Clean Water Act, Section 303 (d)(1), the Department of Environmental Quality (DEQ) completed a 1994-1996 Draft Statewide Assessment of Water Quality Limited Water Bodies (Oregon DEQ, 1996). Although the 1994/1996 draft assessment did not identify any water quality limited water bodies within the Forks Watershed Analysis area, it notes that this determination may be because of a lack of water quality data at that time. Except for Forest Service stream temperature data, there is no other known water quality data for streams within the analysis area. Based on this limited data, it is believed that turbidity and sedimentation are the primary water quality attributes that have been affected by human processes within the watershed; by comparison, water temperatures are secondary concerns.

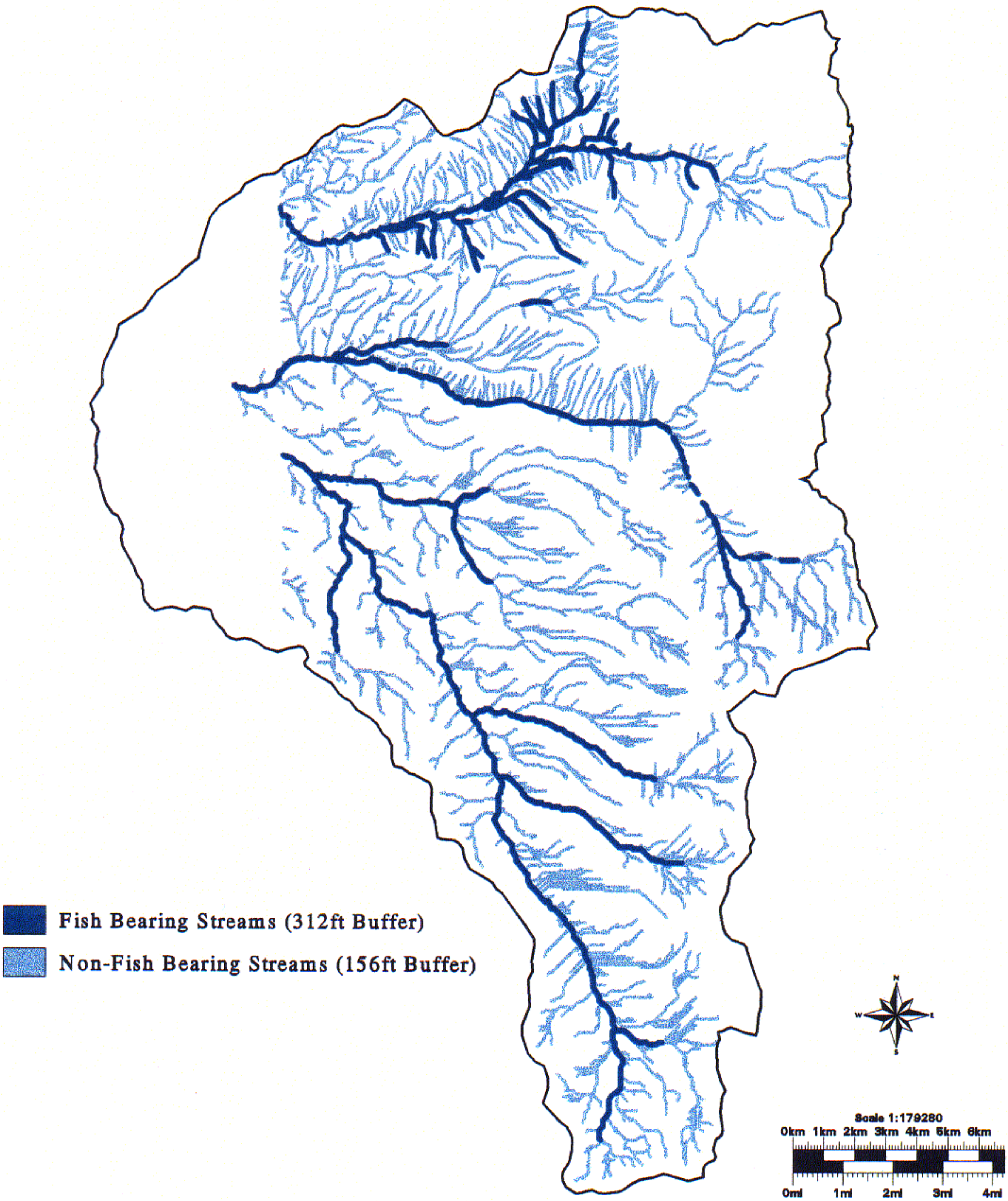
Streams within the analysis area are naturally cool and clear. Two primary reasons exist for this; 1) streams have large contributions of cold groundwater in many locations, and 2) streams have a protective cover of dense riparian vegetation to keep them shaded. Monitoring in recent years has documented that stream temperatures are generally very good.

Figure F in the Hydrology Appendix show stream temperatures for four streams during recent years. The 1994 water year was one of record low flows in streams throughout southwestern Oregon. Water temperatures in 1994 are representative of worst case conditions. For the streams monitored, none exceeded the Oregon water quality standard for summer temperature.

The human processes most responsible for sedimentation are roading and timber harvest operations (yarding, landings, etc.). Roads are the primary contributors of sediment to aquatic systems and the magnitude of input is directly related to overall road density, road proximity to riparian areas, and the inherent erodibility and mass wasting potential of roaded areas (see Streamflow).

# South Fork & Middle Fork Watershed

## Fish Bearing and Non-Fish Bearing Streams

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## HUMAN USES

### Livestock Grazing

Historically, Forest Service management objectives for the Lodgepole, Imnaha and part of the Rancheria Cattle and Horse Allotment in the Forks Watershed were to maximize production and insure proper utilization of the forest resources on a sustained yield basis. See Map 23 for Range Allotment Area locations within the watershed.

Grazing in the watershed began as early as 1890 in the Rancheria Allotment. At that time, many of the lower elevation stands contained scattered, large ponderosa pine over an open, grassy understory. The first livestock use in this area were sheep and horses. By 1908, cattle dominated the rangelands. Heavy grazing in those early days resulted in the loss of many climax grasses and the elimination of a considerable number of the choice brouse species.

Grazing began in the Imnaha Allotment around 1911. Initially, the use was heavy in this area due to the abundance of grassy openings and easy accessibility. An environmental assessment for this allotment was completed in 1976. This assessment recommended a deferred system of grazing where cattle were only allowed to graze certain areas at specific times of the year. Also, the herds were split and driven to different locations on the allotment to lessen the impacts from concentrated use. Currently, approximately 120 cows are permitted to graze this allotment each year.

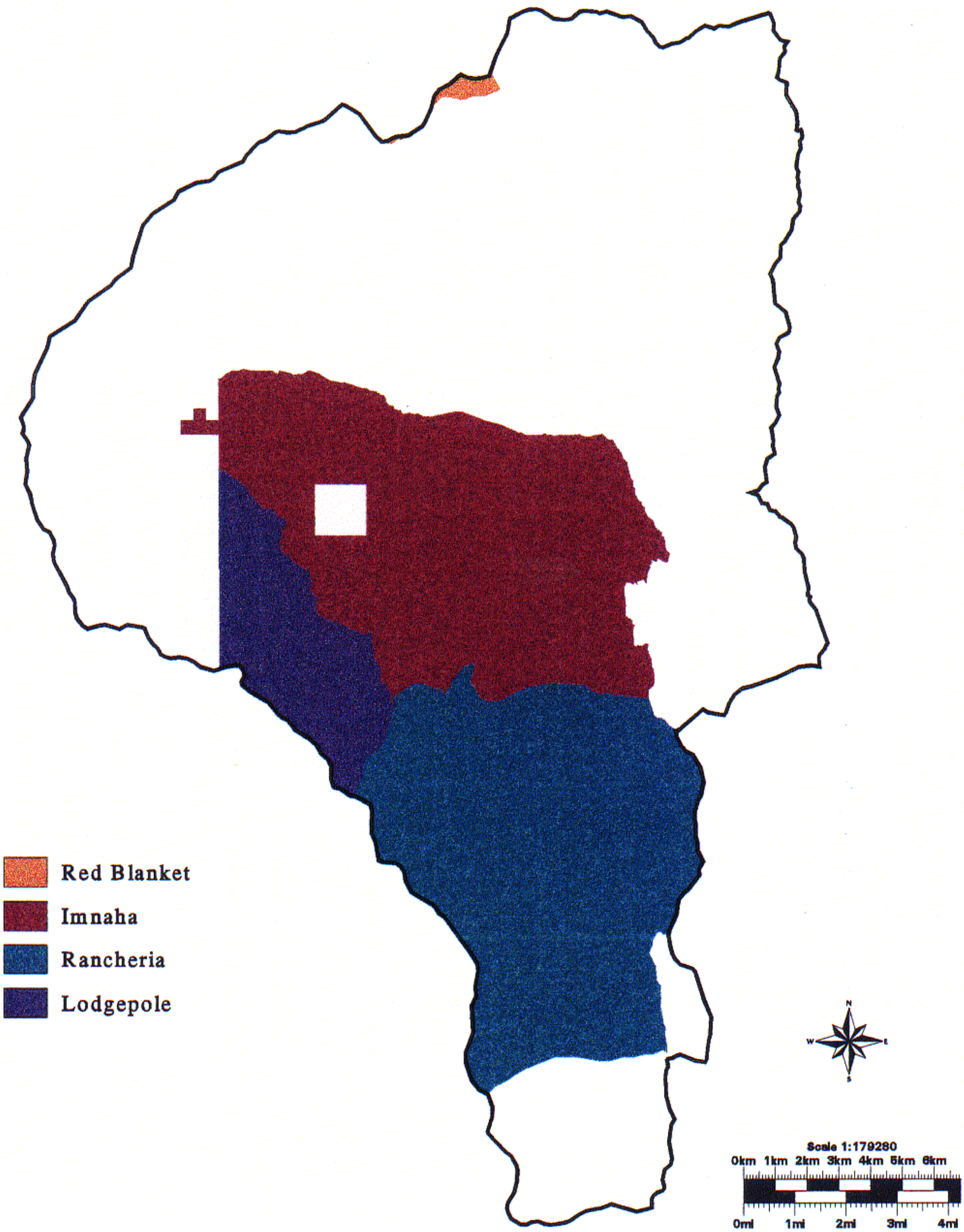
The Lodgepole Allotment is a combination of two smaller allotments merged in 1976, the Buck Creek and Jackass Allotments. Grazing began in this area in 1917 and continues today. The number of cattle allowed in the allotment has fluctuated from a low of 30, to as many as 225, with the heaviest occurring between 1920 and 1924. Today, the grazing is split between two permittees with a total of 150 cows permitted.

The most frequently occurring grazing problems have been over-utilization in some high meadows, tresspass from adjacent allotments and over-grazing because of poor distribution. The majority of the Forest Service managed land in the watershed is not considered primary rangeland. Rather, most of the land is used as transitory range because it is dominated by forested areas with grazing opportunities in meadows and created openings.

# South Fork & Middle Fork Watershed

MAP 23

## Range Allotment Areas

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**Recreation Use**

Recreation use in the Forks watershed can be categorized into wilderness and non-wilderness opportunities. The wilderness opportunities consist primarily of backcountry day-use and camping via the large network of trails within the Sky Lakes Wilderness Area. Due to the high elevation and lingering snowpack, concentrated use does not usually begin until early July each year. However, sporadic use does occur into the fringes of the wilderness as soon as the snow begins to recede in late-spring. Between the Fourth of July and Labor Day, the highest concentrated use occurs in Blue Canyon in Seven Lakes Basin. This is primarily due to the beautiful scenery and the fact that recreationists are attracted to water. The northern portion of the wilderness receives some day-use during the summer months, but peaks during the month of October, due to hunting.

The non-wilderness opportunities consist of a few developed campgrounds, dispersed campsites, and a few trails. Though these sites receive use beginning in late spring, use is sporadic, peaking during the three summer holiday weekends and again during the deer and elk hunting seasons in the fall. Currently, hunting draws the most people to the watershed. Other activities that bring people to the non-wilderness portion of the watershed are firewood cutting, berry picking, fishing, and wildlife viewing.

Developed Recreation Sites: There are three developed recreation sites in the Forks Watershed. The Imnaha Campground, located off Forest Road 3700, provides four campsites with no water system. The current level of use is described as "moderate". The South Fork Campground is located off Forest Road 3400. It provides six campsites and a hand-pump well water system. The current level of use is described as "low". The Parker Meadows Campground is located off Forest Road 3700 and provides nine campsites with a hand-pump well water system. The current level of use for this site is described as "low".

An additional three developed recreation sites have been abandoned and allowed to transgress into dispersed camping areas over the last 10 years. They were abandoned for several reasons including low use, inadequate funding, salvage logging activities within the site due to tree mortality from disease, and changing forest visitation patterns.

Dispersed Campsites/Forest Camps: There are 41 recorded dispersed sites within the Forks Watershed area. To date, very little information is known on the level of use for these areas. It is estimated that only 15% of the campsites receive moderate to high use. The majority of these campsites are utilized for short periods during deer and elk hunting seasons.

Trails: There are 30 maintained trails within the watershed totaling approximately 111 miles. Six of these trails are non-wilderness and the remainder are wilderness trails that are either primary access into the wilderness, or interior trails within the wilderness. Use of the trail system ranges from low to high depending on the trail terrain, access and destination features. Trails that feature the high elevation wilderness lakes receive the highest use.

Special Uses: There are four authorized special use permits granted within the Forks Watershed. They include three Outfitter and Guide permits into specific regions of the Sky Lakes Wilderness, the north end, south end and Blue Canyon Areas. These permits allow day-use and extended trips mainly during the summer and fall months. The fourth permit is for the Imnaha Guard Station Rental. The Guard Station entered the rental program in the fall of 1995 and is used year-round.

Sky Lakes Wilderness Area: Historical uses that have influenced the condition of the Sky Lakes Wilderness began in the late 19th century when sheep grazing was introduced. The sheep were replaced by cattle in the early 1900's and cattle grazing in the wilderness has continued to the present time. The construction of the Oregon Skyline Trail in the 1920's was another critical point of influence to today's wilderness. This trail is now part of the Pacific Crest National Scenic Trail System. The initiation of fish stocking in the high lake basins during this time established the area as recreational destination. The discovery of "leisure time" in the 1950's and 60's brought new visitors to this backcountry paradise. Camping and heavy use along the lake shores have led to soil compaction and vegetation loss that still impacts the area today. However, because the main east-west travel routes were located well to the north and south of the Sky Lakes area, the remote character was preserved. A series of recommendations beginning in 1932 with the set-aside of Seven Lakes Basin, and ending with the 1979 recommendation to include the Sky Lakes Area in the Oregon Wilderness Bill, protected the area from further encroachment and development.

Today's uses continue to influence the wilderness area, but because of defined management objectives and an increasing awareness of wilderness ethics, restoration and changing use patterns, the area continues to provide a primitive, backcountry experience.

## Timber Harvesting and Roads

Timber harvesting in the Forks Watershed began on the lower elevation private lands in the early 1950's. The increased demand for timber and wood products in the post-war years brought an increase in demand to harvest on federal lands. Timber harvesting began on Forest Service lands in the early to mid 1950's in the Rustler Peak area. This initial harvesting had little impact on the watershed until the late 1960's when an extensive road system began to be built into the upper reaches of the watershed. However, technology limited the extent of harvesting to the flatter slopes.

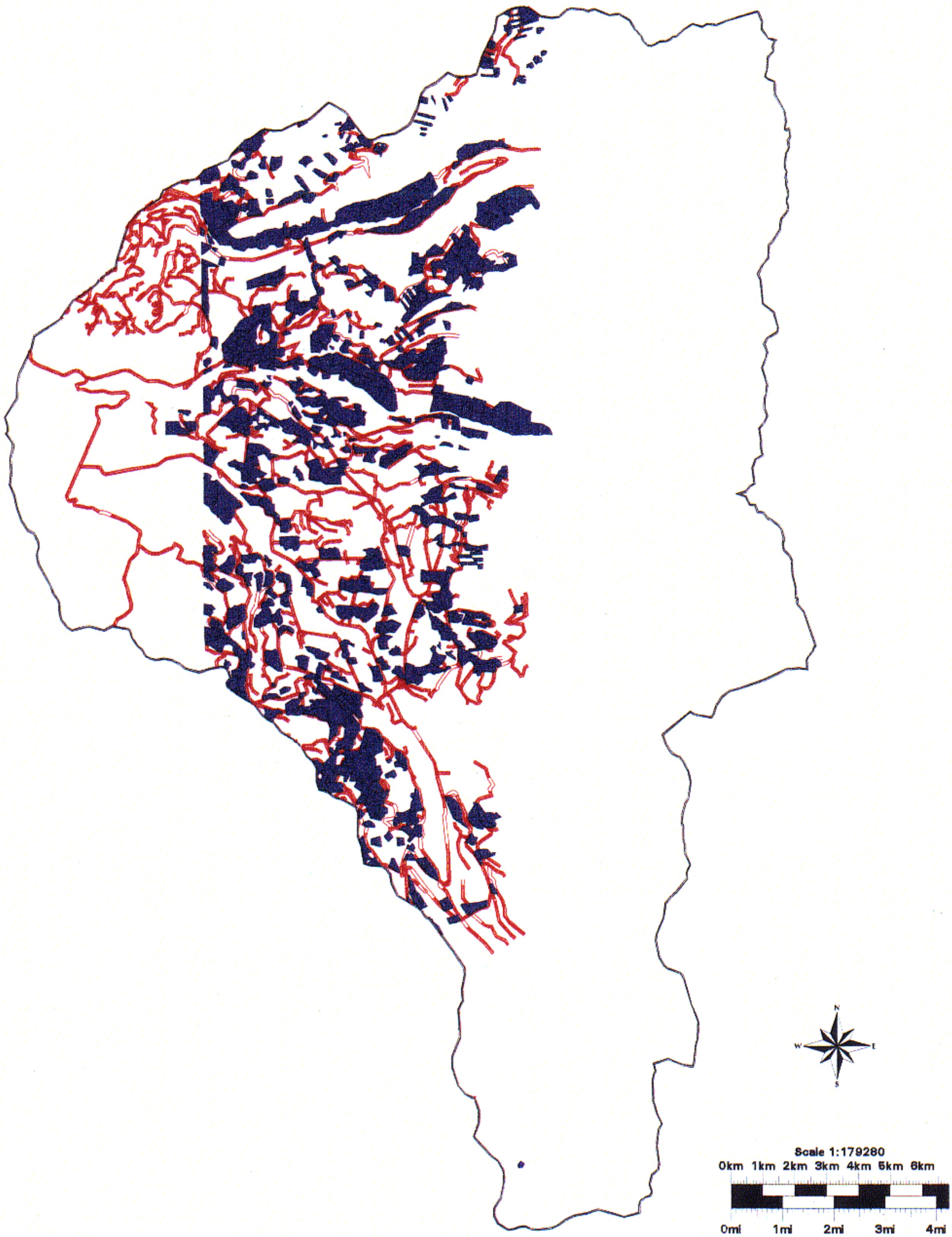
Timber harvesting throughout the 1970's and 80's was accompanied by road construction to access the abundant timber stands, improve fire protection capabilities, and provide access for recreation and administrative purposes.

Timber harvesting reached it's peak in the middle 1980's, through the early 1990's. At that time, a shift in applied silvicultural practices was occurring. Shelterwood and other partial removal harvest systems were being applied at a broad scale. See Map 24 for the location of harvested areas in the watershed.

# South Fork & Middle Fork Watershed

MAP 24

## Past Harvest Areas



Today, the road system in the watershed is extensive with almost no undriveable locations outside of the Wilderness. There is a total of 294 miles of "system roads" in the watershed. System roads are defined as roads that the Forest Service is responsible for maintaining. Road management objectives have been identified and are on file for these roads. Private roads, skid roads, and other non-system roads are not included in this road summary. The roads in the watershed are assigned a maintenance level from 1 through 4. Level 1 roads are open on a temporary basis for management or other administrative purposes. The intent is that these roads are to be closed with some type of permanent closure device. Currently, there are 81 miles of Level 1 roads in the watershed. Although identified as being closed or blocked, 60 miles of these Level 1 roads are currently open.

There are approximately 168 miles of Level 2 roads in the watershed. These roads are not maintained for passenger car type traffic, but are maintained for high clearance vehicles only. Although identified as open, these roads are sometimes closed with gates to protect wildlife or other resources.

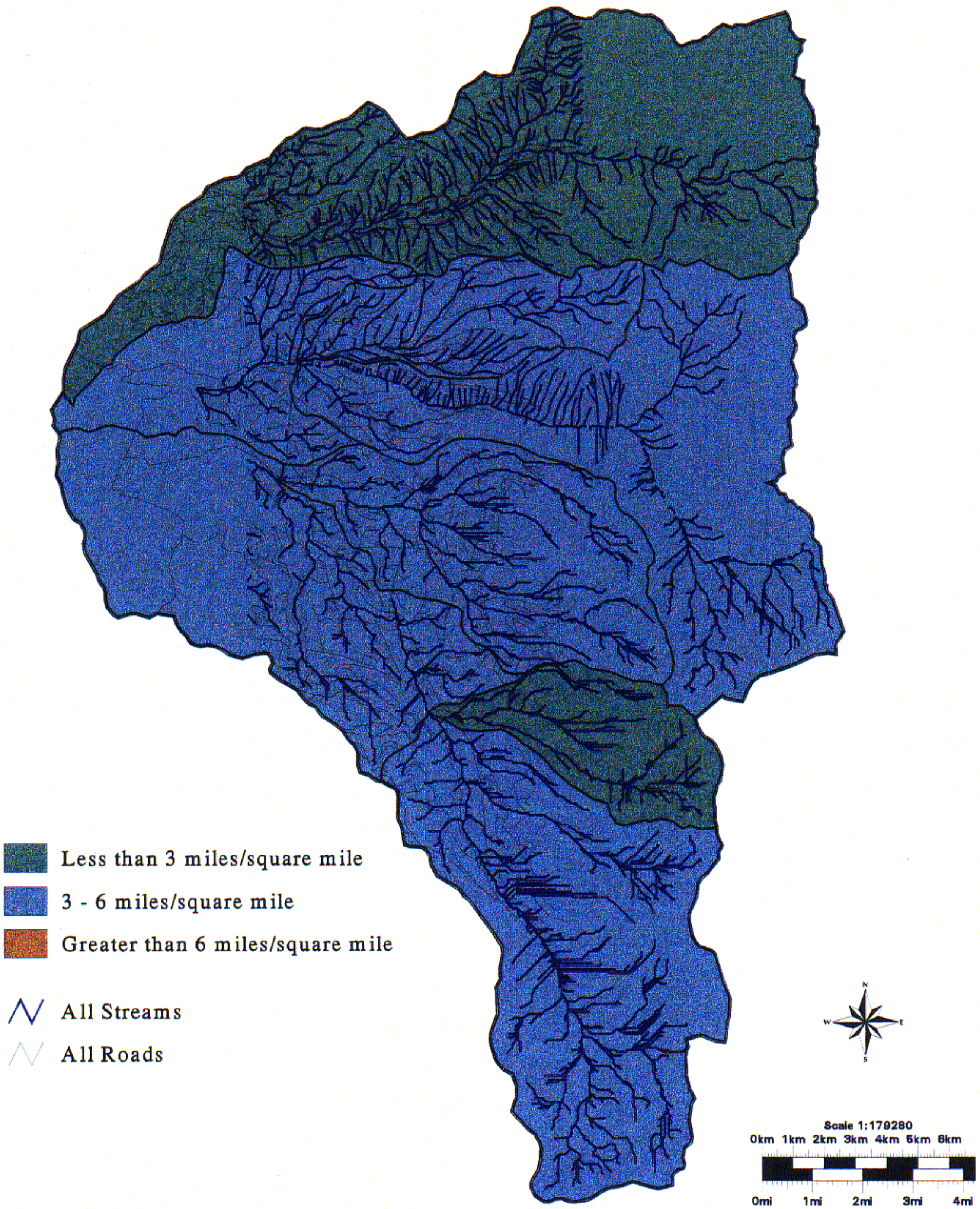
There are approximately 22 miles of Level 3 roads in the watershed. These roads are maintained for passenger car travel. Level 4 roads are generally paved or have dust abatement during periods of high use. There are approximately 23 miles of Level 4 roads in the watershed.

Of the 294 miles of roads in the watershed, approximately 67% have an aggregate surface, approximately 27% have a dirt or native material surface, and 6% have a paved surface. The average density of open roads on National Forest lands, outside of Wilderness, is 3.36 miles of road, per square mile. Map 25 illustrates the extent of road construction (road density) throughout the watershed.

# South Fork & Middle Fork Watershed

MAP 25

## Road Density by Subwatershed



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# PART IV
# FINDINGS & RECOMMENDATIONS

## FINDINGS AND RECOMMENDATIONS

This section summarizes the elements of the Middle Fork and South Fork of the Upper Rogue River Watershed ecosystem that are the most relevant to the current management, human values and perceived resource conditions at this time. These elements were identified by the interdisciplinary analysis team during the characterization process or discovered during synthesis and interpretation. The key watershed issues were the focus and drivers for the analysis and recommendations.

### FIRE RISK AND MANAGEMENT

***Findings:*** Historical fire events and past management practices provide insight for future management of the Forks Watershed. Fire has had a major role in shaping the vegetative patterns of this landscape. Historical fire return intervals has ranged from 11 to 126 years. Specific areas across the entire watershed have burned at various times with a wide range of intensities throughout the recent and distant past. These historical fires left a mosaic of vegetative patterns across the pre-harvest landscape.

Fire prevention and exclusion policies have facilitated the development of late-successional stands as well as an increase in the risk of large scale wildfire. This trend will continue as late-successional objectives are implemented across a larger portion of the watershed. Developing late-successional conditions across such a large area will result in a increase in ladder fuels and overall biomass which, when burned in a wildfire situation can cause severe resource damage affecting soils, water, wildlife and vegetation.

Current fire risk in the watershed is rated at low to moderate based on fire history, past fire locations and fuel loads. Current management direction requires full suppression of any fire start in the Late-Successional Reserve. A Prescribed Natural Fire Plan (PNF) is being developed for the Sky Lakes Wilderness lead by a team from the Winema National Forest. This plan will identify locations and conditions that will direct managers to allow natural fire to advance naturally in the Wilderness. However, until that plan is completed and financially supported, full suppression is the fire management policy in the Wilderness.

Using fire as a tool in future management of the watershed would bring fuels conditions to a more natural level. Fuels treatments would be strategically located along ridgetops and south facing slopes to assist in suppression success if a wildfire occurs. This treatment would have to be integrated and blended with the Late-Successional Reserve (LSR) objectives. Allowing natural fire to occur in specific areas of the watershed would maintain those areas in a early seral condition.

The South Cascades Late-Successional Reserve Assessment (1998) proposes to maintain at least 75% of the LSR complex in a late-successional vegetative condition with no more that 28% in the high fire hazard condition. Currently, only 18% of the Forks Watershed is considered to be in a high fire hazard condition. This is the result of prior timber harvesting and extensive fuel treatments.

***Recommendations:***

- Maintain vegetation and fuel conditions that would result in flame lengths of less than 4 feet, if a wildfire occurs over any portion of the landscape.

- Fuel treatment areas should be identified through an interdisciplinary fire management planning process and based on hazard and risk.

- Support the LSR objectives through thinning and pruning vegetation and the use of prescribed fire. Treatments should occur over time and in stages.

## LATE-SUCCESSIONAL VEGETATION

***Findings:*** Prior to settlement by Europeans, there may have been less "old-growth" than at the present time, at least in southwestern Oregon. Frequent fires set by Native American inhabitants or by lightning, maintained areas in a much more open condition, when compared with today.

Computer simulations using the Vegetation Dynamic Development Tool (VDDT) used to predict proportion of seral stages in the future given certain disturbance regimes, show that under "natural" disturbance probabilities, less "old-growth" might be present in the future. This suggests there may have generally been less "old-growth" in the past in southwestern Oregon.

The South Cascades LSR Assessment recommends that 75% of the LSR be in late seral condition. Much of the Forks Watershed is in the southern portion of this LSR. The Forks Watershed contains approximately 23% in a late seral stand condition. To produce 75% in this watershed may be impossible, given disturbance types and frequencies experienced in the past. Tom Atzet, Forest Service Area Ecologist, estimates about 35% to 50% in a late-successional condition may be more realistic and appropriate; in addition, amounts in the 45% to 50% range may be impossible to maintain over time in this area.

The location of late seral stands in the watershed is key to maintaining them over time. LSR conditions are more likely to develop in areas where fire is less likely to occur or become intense. Wet, protected areas, such as high elevation north facing slopes and riparian habitats are excellent candidates for development of late seral conditions. More investigation is needed in the watershed to ascertain the amount and specific areas where LSR conditions have a high chance of developing.

Fire effects on stand development, as well as insect and disease out-breaks, greatly influence the structure and composition of the forest landscape. Fire exclusion has lead to an increase in shade tolerant species and has influenced the insect/disease infestation patterns seen today. There has been a considerable shift in the fuel composition across the forest floor. Today, more of the down wood component is in the smaller diameter ranges. The South Cascades LSR Assessment indicates that the down wood component was historically larger sized material. Past management practices have probably influenced this change.

*Recommendations:*

- Manage stands to develop multiple ages and multi-layered characteristics through thinning, uneven-aged management techniques, and prescribed natural fire.

- Maintain ponderosa and sugar pine components where historical or present occurrence is evident; apply density management around large diameter pines.

- Use past and present late seral mapping to locate the best areas to maintain late successional vegetation and as a tool to support natural fire prescriptions.

## ROAD NETWORK

***Findings:*** Road development in the Forks Watershed proceeded unrestricted through the 60's, 70's and 80's, except in the Sky Lakes Wilderness. The Forest Service managed lands, outside of the Wilderness and excluding Crater Lake National Park and private land, contain an extremely high road density. The watershed currently contains over 3.36 miles of road per square mile within manageable (Matrix) lands.

Roads and road construction have been the major human impact in the watershed. Effects of this impact are measurable in terms of introduced sediment in streams, stream flow re-direction and concentration, and surface flow production. The vegetation, as well as the road system density, plays a significant role that may affect peak water flows in this watershed. The landscape history of development and management have increased the risk of incurring adverse effects from natural events such as heavy rain and rain-on-snow events.

Drainage-way crossings, where roads and streams intersect, cause streams to increase flow more quickly, increasing sedimentation and concentrating larger volumes of water through the natural stream channels. The Forks Watershed contains approximately 96 drainage-way crossings; more may exist when considering crossings associated with Level 1 roads. Roads in the Forks Watershed have a low to moderate influence on surface flow production.

## POTENTIAL FOR ADVERSE WATERSHED CUMULATIVE EFFECTS

***Findings:*** Adverse cumulative effects from land-use changes and channel modifications can occur. The potential for them to occur and their magnitude will depend on the number, type, and location of changes (activities), watershed sensitivity, existing channel/habitat condition, and/or existing watershed condition (Draft ESA-Section 7 CE Process, Version 1.3).

For the purpose of this watershed analysis, the relative risk of incurring adverse cumulative effects has been determined (below) based on professional judgment used in conjunction with available data.

The process used results in an index of current watershed condition based on two key indicators which influence the hydrologic functions of a landscape. The two key indicators are: road density and the percent of the watershed which is covered with "hydrologically immature" vegetation, defined as stands under 30 years old (Draft ESA-Section 7 CE Process, Version 1.3).

The following table reflects the percent of vegetative cover less than 30 years old by sixth field watershed (as determined by 1990 orthophotos; 1:12000 aerial photos; and field verification) and the relative condition rating ("Good" indicates less than 15% of sixth field watershed with stands less than 30 years old, "Fair" indicates 15%-30% of sixth field watershed with stands less than 30 years old, and "Poor" indicates greater than 30% of stand is less than 30 years old).

**Table 15. Condition Rating based on Percent of Sixth Field Watershed with Vegetated Stands Less Than 30 Years Old.**

| Sixth Field Watershed | Percent of Sixth Field Watershed with Vegetated Stands less than 30 Years Old | Condition |
|---|---|---|
| Rogue River S Fork, Upper | 13 | Good |
| Big Ben Creek | 1 | Good |
| Imnaha Creek | 26 | Fair |
| Rogue S Fork - Lodgepole | 31 | Poor |
| Rogue River Middle Fork, Upper | 11 | Good |
| Bessie Creek | 27 | Fair |
| Red Blanket Creek | 14 | Good |
| Rogue River Middle Fork, Lower | 31 | Poor |
| **Forks Watershed Area (Average/overall)** | 18 | Fair |

As the percent of vegetated cover less than 30 years old increases, there is greater increase in groundwater concentrations, accelerated surface saturation and overland flow leading to higher peak flows within a shortened period of time as compared to a fully vegetated condition. Map 26 displays the hydrologic recovery by subwatershed for the Forks Watershed.

Road density, expressed as miles of road per square mile of sixth field watershed area, in conjunction with watershed slope is a good index of the overall potential for roads to affect watershed function.

The following table presents a generalization about the effects on watershed condition of various road densities relative to gross watershed slope (Draft ESA-Section 7 CE Process, p. 5).

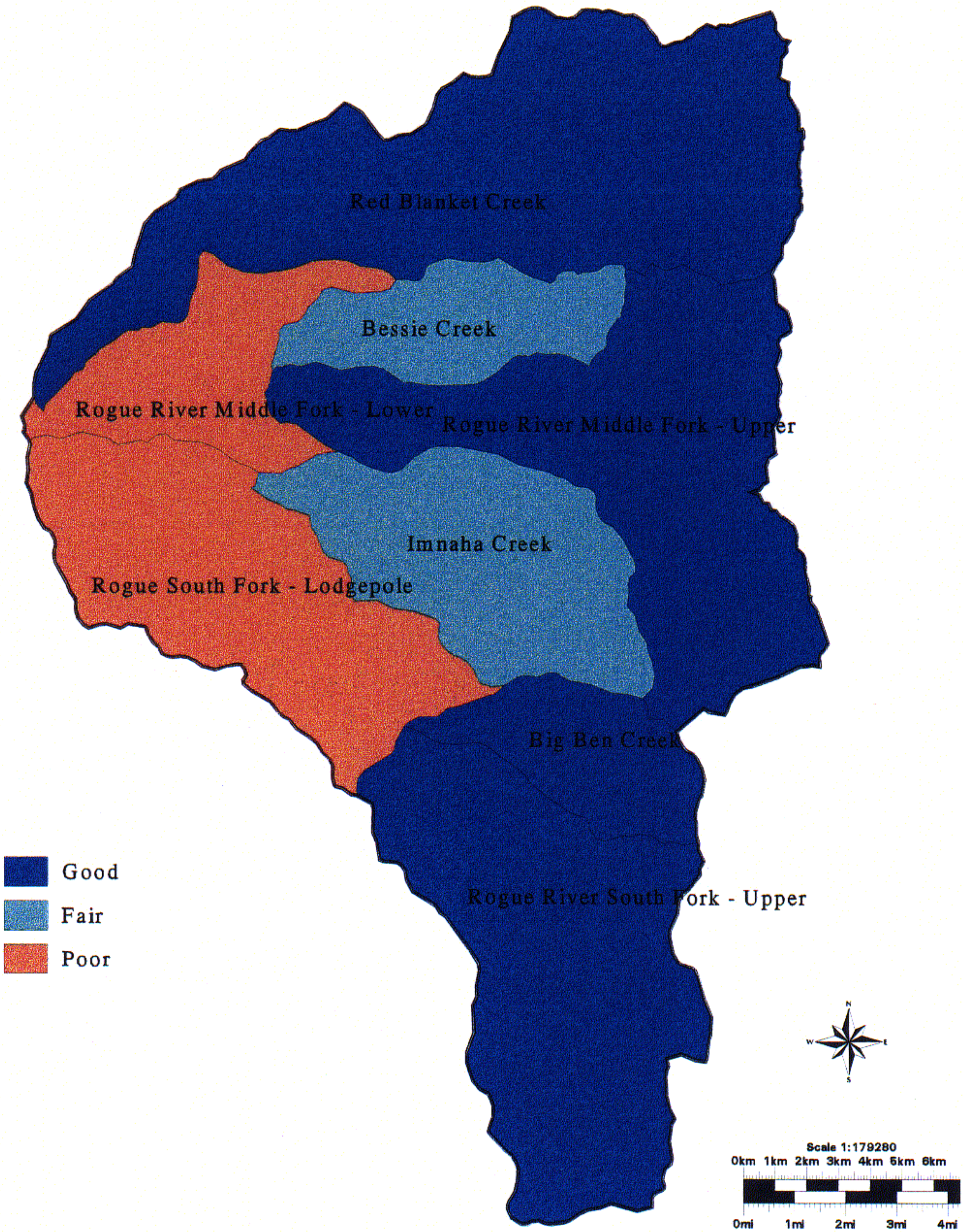
**Table 16. General Watershed Condition Based on Road Densities Relative to Watershed Slope.**

| Condition Rating | Road Density (mi/sq mi) Watershed Slope>30% | Road Density (mi/sq mi) Watershed Slope<30% |
|---|---|---|
| Good | <2 | <3 |
| Fair | 2.1 - 3.5 | 3.1 - 4.5 |
| Poor | >3.6 | >4.6 |

# South Fork & Middle Fork Watershed

MAP 26

## Hydrologic Recovery by Subwatershed



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The following table displays road densities by sixth field watershed (in miles per square mile), sixth field watershed slope, and the general watershed condition as shown in the previous figure.

**Table 17. Forks Watershed Sixth Field Condition Based on Road Densities Relative to Watershed Slope.**

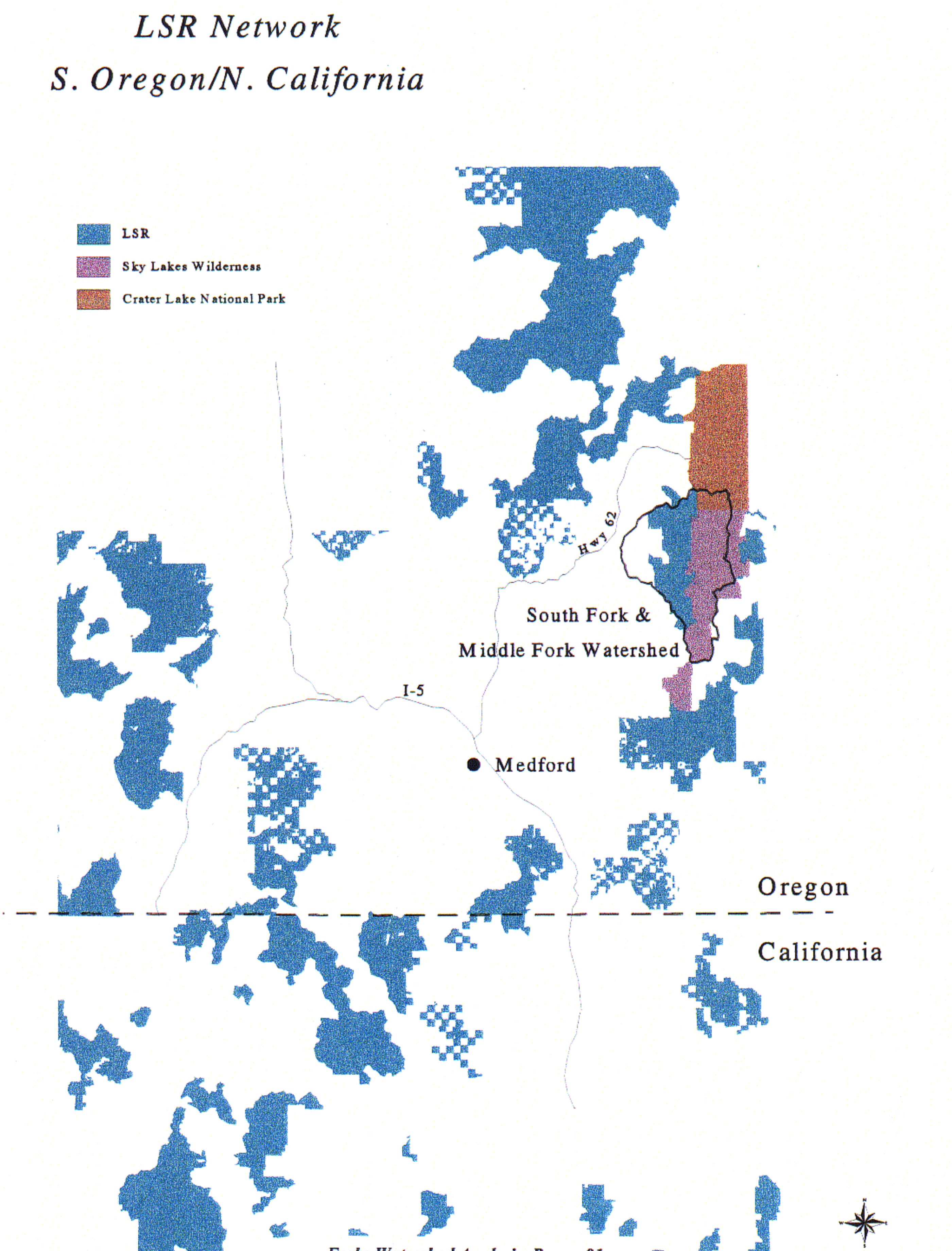
| Sixth Field Watershed | Road Density (mi/sq mi) | Sixth Field Watershed Slope (percent) | Sixth Field Watershed Condition |
|---|---|---|---|
| Rogue River S Fork, Upper | 3.6 | 5 | Fair |
| Big Ben Creek | 2.0 | 8 | Good |
| Imnaha Creek | 4.6 | 7 | Poor |
| Rogue S Fork, Lodgepole | 5.0 | 3 | Poor |
| Rogue River Middle Fork, Upper | 4.0 | 7 | Fair |
| Bessie Creek | 3.9 | 10 | Fair |
| Red Blanket Creek | 2.6 | 5 | Good |
| Rogue River Middle Fork, Lower | 4.3 | 2 | Fair |

All roads discussed represent "System" Roads only, meaning that actual road densities are higher if "non-system" road segments are considered (includes skid trails, mining roads, and landings). Currently, "non-system" road segments are not mapped. Acreage used for road density determination excludes acres of Wilderness, National Park and private land outside the National Forest boundary; it includes acreage and miles of roads on private land within the National Forest boundary.

## HABITAT CONNECTIVITY

***Findings:*** Using the 1947/49 vegetation map as a baseline, there has been a 43% decrease in the amount of old-growth stands in the watershed from that time. Conversely, there is a two fold increase in the amount of stands which make up the mid-successional component. This is a result of stands developing after the 1910 South Fork fire, and timber harvest in the 50's. Early seral conditions have decreased since that time. This trend is likely due to the effect of fire suppression in the watershed.

Northern spotted owl habitat has decreased throughout the Pacific Northwest. The Forks Watershed exhibits no exception to this trend. This trend, as well as the listing under the Endangered Species Act of the northern spotted owl along with the recent listing of the marbled murrlett (*Brachyramphus marmoratus*) and coho salmon (*Oncorynchus kisutch*) highlights the importance of late-successional habitat. Late-successional habitat and the processes and functions it provides are being examined in great detail throughout the Northwest. Scientific fields such as Conservation Biology are at the fore front in determining the types of changes being made to the remaining pieces of late-successional habitat within Pacific Northwest forests. Map 27 shows the location of the Late-Successional Reserve allocation network and it's connection to the surrounding LSR strategies. The Forks Watershed plays a key role in maintaining connectivity in the southern Cascade Mountains. This area provides the north-south link for genetic interchange and species migration between the northern California and central Oregon Cascades, with branches to the Siskiyou and coast mountain ranges.


LSR Network
S. Oregon/N. California
LSR
Sky Lakes Wilderness
Crater Lake National Park
Hwy 62
South Fork &
Middle Fork Watershed
I-5
Medford
Oregon
California

Large carnivore species (e.g., grizzly bear, wolf) are no longer part of the ecosystem and peninsular populations, such as the California wolverine, and Pacific fisher are rare or non-existent in the Forks Watershed. Avian populations are continuing to decline, especially for those species dependent on low elevation late-successional habitat.

Species once thought extirpated (i.e., peregrine falcon) from the landscape are slowly returning to reoccupy historical nest sites, as well as establish new nesting locations. The rocky crags along the Cascade Crest in the Sky Lakes Wilderness provide prime nesting locations. However, population numbers, and especially reproductive success is far below the level set for determining a recovered population. Organo-chlorine and phosphates, as well as PCBs, are still influencing the success of this and other species which are sensitive to these types of chemicals.

More species are being pushed to the lower limits of their habitat threshold (i.e., habitat is becoming a limiting factor). The effects of "packing" and stresses associated with this phenomena are becoming more apparent across the landscape. The northern spotted owl is a good example of the packing effect.

Fragmentation is influencing the distribution and numbers of early-successional animal species found in the watershed. Deer and elk population numbers have risen since the early 1900's. Sport hunting and general recreation in the area is increasing to the point where it may be affecting and stressing wildlife populations. Research being conducted in the Pacific Northwest is focusing on forest fragmentation and the affect it has on neo-tropical migrant birds. Some of the preliminary findings indicate that early successional species, especially edge dependent species, are increasing. Road densities on the landscape are likely to continue to decrease due to declining road maintenance funds and the current focus on implementing the Northwest Forest (USDA 1994) and the Rogue River Land and Resource Management Plan (USDA 1990).

New survey and manage species (e.g., great gray owl, red tree vole) are being examined more intensively than ever before. Habitat components, such as standing dead snags and down large logs, are being emphasized in management prescriptions. Many studies, old and new, indicate that a large number of species are highly dependent on standing dead and down habitat for maintaining their viability within the landscape (watershed and forest). Vegetation influenced by almost 100 years of sheep and cattle grazing has influenced species composition within many of the meadows throughout the forest, and especially in the higher elevations meadows within the Sky Lakes Wilderness. Though sheep grazing is no longer practiced in the watershed, cattle grazing still occurs at fairly high numbers. However, the current level of livestock grazed in the watershed does not approach the historical levels.

The current forest condition contains about 1/3 of the historical late-successional habitat that once existed in the watershed. Late-successional habitat conditions are expected to increase as a result of more than 55% of the watershed being allocated to Late-Successional Reserve. Several factors will influence this condition over time. They include natural and prescribed fire and ecosystem management projects to support late-successional stand development. Fragmentation as a result of management activities have affected habitat connectivity in the watershed. Species with restricted mobility or specific habitat requirements are most affected.

## WILDERNESS USE

***Findings:*** The Forks Watershed receives, in general terms, low social/recreational use. However, there are specific areas and times where and when recreational use peaks. The watershed contains a diverse range of recreation opportunities that draw people to the area. Many of these opportunities are less developed or primitive in nature.

The non-wilderness opportunities consist of a few developed campgrounds, dispersed campsites and a few trails. The wilderness opportunities consist primarily of backcountry day-use and camping via the large network of trails within Sky Lakes Wilderness Area. Hunting draws the most people into the area.

The present condition of the wilderness as described by the Wilderness Recreation Opportunity Spectrum concept (see Recreation Appendix J) takes into account the physical, biological, social, and managerial components. It was determined that due to the high standard trail system, the narrow shape and ease of access, and the highly impacted lake shore campsites, the Blue Canyon and Seven Lakes Basin areas are considered to be in the "semi-primitive" condition.

Historical uses that have influenced the current condition in the Sky Lakes Wilderness began in the 19th century when sheep grazing was introduced. Sheep grazing was replaced in the 1920's by cattle grazing, which continues to the present time. The King Spruce and Alta Lake Trails have the heaviest cattle use and receive major resource damage in the form of soil compaction and erosion. The Seven Lakes and Blue Canyon Trailheads have had drift fences installed to deter access into the highly used lake basins. This has minimized recreation conflicts and further damage to the lake shores. Grazing also occurs within the Wilderness by recreational stock users. Recreational use peaked in the 1950's and 1960's, when heavy lake shore camping led to soil compaction and vegetation loss.

Today's users and the variety of uses continue to influence the wilderness area and consequently the entire watershed, but because of the defined management objectives, and an increasing active awareness of wilderness ethics, restoration and changing use patterns have maintained the wilderness area as a primitive "backcountry" experience.

The ability to promote a fully functioning ecosystem within the Wilderness is much greater than on lands outside wilderness. Current regulations and the limited time-frame that the Wilderness is accessible, minimize alterations and impacts to the ecosystem. Current regulations and restoration projects are designed to allow natural process to prevail.

***Recommendations:***

- Rehabilitate dispersed campsites along creeks to minimize riparian impacts by placing natural barriers and moving sites away from the immediate shoreline.

- Restore dispersed campsites to natural conditions within the high infiltration zone near the Big Butte Watershed.

- Install, replace and repair drift fences at all Wilderness access points (trails).
- Reconstruct drainage on all trail systems within the watershed area.
- Restore impacted campsites within the Sky Lakes Wilderness.

## WATER QUALITY

***Findings:*** The expected future trend is that large flow events on the main stem streams of each sixth field watershed will not change noticeably from the past or present. As the Northwest Forest Plan is implemented, it is expected that peak flows in headwater streams will slowly decrease. This envisions hydrologic recovery of the Rogue South Fork - Lodgepole and Rogue Middle Fork - Lower drainages, and watershed restoration activities as outlined in the Northwest Forest Plan. If the present trend of decreasing road maintenance budgets continues, the potential for road-related erosion and sedimentation, particularly in Imnaha Creek and Rogue South Fork - Lodgepole, will increase.

Climatic conditions directly influence the volume of water available to these basins. On an annual basis, the watershed analysis area currently yields about 293,000 acre-feet of water. However, changes in the timing, distribution, and quantity of flow are affected by a number of contributing factors, including; vegetation manipulation, road construction, and water withdrawals. It is unknown whether the net effect of these activities have increased or decreased the volume of water within sixth field watersheds.

## FLOW REGIME

***Findings:*** The geology and climatic patterns within the Forks Watershed analysis area play key roles in determining the character, timing and distribution of flow within the watersheds. Peak flow events are generated in late spring in response to snowmelt. However, during rain-on-snow events, located within the transient snow zone exists the potential for flashy, record peak flows . Approximately 35% of the watershed analysis area is located within the transient snow zone. The 1964 storm event illustrates the damaging effects of this type of event. Channel-altering increases in high flows have likely occurred in smaller tributary basins with substantial roading and timber harvesting.

Roads are the major human impact on the forest environment within the watershed analysis area. Specific parts of road networks contribute disproportionately to the effects of roads on peak flow increases (Wemple 1994). These road segments are those draining directly 1) to streams, and 2) to culverts leading to streams.

Impacts from roads fall into three areas: introduced sediment into streams; snowmelt redirection and concentration; and surface flow production. The volume of runoff from roads and its speed of delivery to the base of a watershed varies according to road design, road hillslope position, road age, and seasonal soil saturation (Wemple 1994).

Forty five percent of roads within the watershed analysis area are located midslope, where potential is greatest for intercepting subsurface flow and routing to ditches or channels. Roadside ditches and gullies function as effective surface flowpaths which increase drainage density during storm events.

Without effective road drainage improvements, maintenance and/or closure, roads contributing to the stream network will continue to increase peak flows and the frequency of storm events.

## WATERSHED CONDITION RATING

A description of the existing condition, and the range of natural variability of the physical and biological components that contribute habitat elements to streams and promote high quality habitat conditions for fish and other aquatic and riparian dependent organisms has been provided in this assessment. Recommendations have been provided with the goal of maintaining the "natural disturbance regime" of this watershed. These recommendations address the objectives of the Aquatic Conservation Strategy (ACS). Management actions other than those listed in the recommendations, will need to be analyzed using the Watershed Condition Rating to determine if the action will meet ACS objectives.

A current watershed risk rating was obtained for the eight sixth field watersheds in the Forks Watershed by using a process for determining risk of cumulative watershed effects from multiple objectives. An "overall condition rating" is obtained by combining a "watershed risk rating" and a "channel condition rating" which are developed from an analysis of various physical parameters for each sixth field watershed. The watershed risk rating is an integrated index of the current degree of human activity within a sixth field watershed, and the consequent potential to contribute adverse impacts to aquatic resources. The two processes evaluated to determine the watershed risk rating are road density and proportion of watershed area with revegetated areas with less than 30 years recovery. The channel condition rating is an index of current channel and fish habitat conditions and is based on indicators believed to limit fish populations.

An "overall condition rating" cannot be determined for this analysis area based on the absence of stream embeddedness data. Collection of embeddedness data or another key indicator of instream habitat viability will be important in determining whether or not future activities will impact fish habitat conditions.

The acres used in the road density calculation do not include Wilderness, National Park, or private land outside the National Forest boundary (acreage and road miles on private land within the National Forest boundary are included).

**Table 18. Current Watershed Condition.**

| | Watershed Risk Rating | | | Channel Condition Rating | | |
|---|---|---|---|---|---|---|
| **Sixth Field Watershed** | **Road Density (mi/sq mi)** | **% Watershed in Stands < 30 yrs** | **Risk Rating** | **Temper-ature (degrees F)** | **Embed-deness (percent)** | **Rating** |
| **Rogue River S Fork, Upper** | 3.6 | 13 | Poor | <62 | no data | n/a |
| **Big Ben Creek** | 2.0 | 1 | Good | <62 | no data | n/a |
| **Imnaha Creek** | 4.6 | 26 | Poor | <62 | no data | n/a |
| **Rogue River S Fork, Lodgepole** | 5.0 | 31 | Poor | <62 | no data | n/a |
| **Rogue River Middle Fork, Upper** | 4.0 | 11 | Poor | <62 | no data | n/a |
| **Bessie Creek** | 3.9 | 27 | Poor | <62 | no data | n/a |
| **Red Blanket Creek** | 2.6 | 14 | Fair | <62 | no data | n/a |
| **Rogue River Middle Fork, Lower** | 4.3 | 31 | Poor | <62 | no data | n/a |
| **Average for Forks WAA** | 3.9 | 18 | Poor | <62 | no data | n/a |

It is important to note that all roads discussed in this analysis represent "system" roads only. This means that actual road densities would be higher if "non-system" road segments were considered (non-system includes skid trails, landings, and mining roads). Currently, "non-system" road segments are not mapped.

***Findings/Recommendations:*** The South and Middle Forks of the Rogue River, Imnaha and Bessie Creeks are rated "Poor." These watersheds have a relatively high probability of incurring additional risks to aquatic specie health based on existing conditions and potential effects from new projects. While additional project activity may not appear to individually adversely affect aquatic habitat/populations, they may present additional risk when viewed cumulatively with other (existing and proposed) impacts. Human processes most likely to provide greater risk are those that remove vegetation and create additional compaction, such as timber harvest and road building, especially within Riparian Reserves. Any new proposal should concurrently include restoration to the extent that it negates or reduces additional risk.

The Red Blanket watershed is rated in "Fair" condition. While not severely impacted, care must be taken in planning new projects so that this watershed is not moved into the "high-risk/poor" category. Restoration is desirable in this watershed to at least negate impacts from new activities that have potential to degrade overall watershed conditions.

## INFLUENCES TO WATER QUALITY

***Findings:*** The human processes most responsible for sedimentation are roads and timber harvest operations (yarding, landings, etc.). Roads are the primary contributors of sediment to aquatic systems and the magnitude of input is directly related to overall road density, road proximity to riparian areas, and the inherent erodibility and mass wasting potential of roaded areas.

The projected future trend of roading in the watershed is largely predicated on implementation of the Northwest Forest Plan. Any new road construction within already roaded areas will likely be minor, particularly within Riparian Reserves. There will likely even be a net decrease of roads in already roaded areas as many are decommissioned or restored as part of the restoration strategy associated with the Northwest Forest Plan.

It is expected that the future trend will be a gradual reduction in sediment yield within the Analysis Area as the Northwest Forest Plan is implemented on public land. This plan emphasizes watershed restoration and hydrologic recovery of recently regenerated areas.

**Stream Flow Regime**

Channel maintenance flows provide for orderly conveyance or uninterrupted transport of water and sediment produced from each watershed through the stream channel network such that overtime, channel dimensions and patterns are self-maintained.

***Recommendations:***

- Reduce peak flows and increased frequency of storm flows by decreasing the current length of roads, ditches and gullies contributing to the stream network. Restoration techniques to disperse water to subsurface pathways include: increasing culvert density, outsloping road surfaces, removing impervious road-bed material, and restoring vegetation on hillslopes.

- Highest priority for road drainage improvements, maintenance, and/or closure are those road segments located in the midslope regions of sub-basins within the transient snow zone, which cross live creeks, or are actively contributing sediment.

**Water Quality**

***Recommendations:***

- Reduce water loading and suspended sediments by stabilizing eroding streambanks; reducing road-related sediment input. (see recommendations for Hillslope Processes)

**Riparian Reserves**

Riparian Reserves are delineated during the implementation of site-specific projects based on analysis of the critical hillslope, riparian, and channel processes and features (Northwest Forest Plan).

- Do not alter Riparian Reserve buffer widths as identified in the ROD/Northwest Forest Plan. Within the Riparian Reserve buffer, the following activities have been determined through this analysis, to be not only acceptable, but necessary to meet the long-term goals of the Aquatic Conservation Strategy:

- Prescribed burning and manual manipulation of live and dead vegetation within intermittenent drainages. Burns must be cool enough to maintain duff and litter layers.

- Riparian silviculture, where there is a deficit of conifers for long-term coarse woody material recruitment. This includes removing deciduous trees and planting conifers. No ground-based equipment should be allowed in this process. Vegetation is not to be removed from unstable or potentially unstable streambanks.

- Streambank stabilization and instream channel improvements. No ground-based equipment should be allowed in this process unless accessible from existing roads.

In the event of a wildfire within the watershed analysis area, salvage logging by any method should be prohibited in sensitive areas (USDA 1995). These sensitive areas include:

- in severely burned areas (areas with litter destruction),
- on erosive or unstable sites,
- on steep slopes, or
- any site where accelerated erosion is possible.

On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery processes should apply (USDA 1995). These limitations are:

- leave at least 50% of standing dead trees in each diameter class,
- leave all trees greater than 20 inches diameter or older than 150 years, generally, leave all live trees,
- because of soil compaction and erosion concerns, conventional types of ground-based yarding systems (tractors and skidders) should be prohibited, and
- helicopter logging, cable systems, and use of existing roads and landings, as well as horse logging may be appropriate, but should be actively monitored and avoided where sedimentation is already a problem for aquatic species.

During fire suppression activities, pumping from small streams should be minimized, as this increases the risks to aquatic ecosystems from post-fire events (USDA 1995). When pumping is utilized, it should be conducted from sufficiently large streams and lakes such that the effects on aquatic biota are negligible.

Fire suppression activities should not include bulldozing within stream channels, riparian areas, wetlands, or sensitive soils on steep slopes or using such areas as access routes for vehicles and other ground-based equipment.

Firelines created by mechanical equipment should not be permitted in riparian areas or sensitive soils on steep slopes.

## MONITORING

Ongoing monitoring efforts within the Forks Watershed should:

- Continue stream temperature and stream flow monitoring.
- Monitor embeddedness within fish-bearing streams.
- Monitor the aquatic benthic macro invertebrate community to determine changes and trends in the benthic community over time and as a result of implementation of aquatic restoration projects.
- Monitor soil conditions to evaluate the effects of vegetation manipulation prescriptions as related to landscape structure and design strategy.
- Monitor spotted owl demographics as an indicator of watershed health in the LSR.
- Estimate, through field monitoring, the degree to which road segments function as new channel segments integrated with the natural stream network (see Wemple 1994, for sampling design).
- Monitor fuel levels and associated fire hazards.
- Monitor the scope and intensity of insect and disease occurrences.
- Monitor coarse woody debris levels and snag densities.
- Monitor terrestrial wildlife species habitat and distribution.
- Monitor non-native plant populations and encroachment.
- Monitor recreational use, hunting levels, and use of special forest products.
- Monitor the effects of grazing on late-successional, riparian and aquatic values.

# APPENDICES

# APPENDIX A
# PUBLIC INVOLVEMENT

United States Department of Agriculture
Forest Service
Rogue River National Forest
Prospect Ranger District
47201 Highway 62
Prospect OR 97536

**Date:** March 24,1997

Dear Neighbor:

The Rogue River National Forest is initiating a Watershed Analysis for the basins of the **Middle Fork and South Fork of the Rogue River.** A watershed analysis is a scientifically based study into the processes and interactions of a given area. The Middle Fork and South Fork of the Rogue River is being studied in order to comply with the Aquatic Conservation Strategy and the ecosystem management objectives of the Northwest Forest Plan.

One of the guiding purposes of the Watershed Analysis is to incorporate the human element into natural resource management. Of course, the analysis will study in detail the physical and biological processes and conditions of the area but it will also provide valuable information on human uses, values and expectations.

Our Watershed Analysis Team is interested in what you know of and what you expect from this area. We want to know what is important to you now and what will be important to you in the future.

As you can see on the enclosed map of the watershed, this area contains a large portion of the Sky Lakes Wilderness, a corner of Crater Lake National Park and several parcels of private land. We are not proposing projects in these areas. This analysis will document the existing condition and provide information for monitoring change at the landscape scale.

A watershed analysis is not a decision making process or document. The end product will be a report describing the existing condition of the area, the desired future condition and processes and recommendations for future management on National Forest land.

If you have information or recommendations for this area or if you would like to review the watershed analysis summary when available, call Mark Martin (project leader) at (541) 560-3437.

Sincerely,

Robert L. Wilcox
Prospect District Ranger

## Processes or Features of the Watershed

| Physical | Biological | Human |
| --- | --- | --- |
| High Cascades Topography | High Elevation Vegetation | Recreation Value |
| Complex Soil Conditions | Mix of Veg Conditions | Fire Exclusion |
| Many Lakes and Streams | High Water Quality | Past Mngt/Roads |
| Ground Water Near Surface | Scattered Old Growth | Hunting Pressure |
| High Road Density | Fire Exclusion | Agriculture on Pvt |
| N/S Corridor | Cold/Sterile Water | |
| Steep Canyon Walls | | |

## Key Features of the Watershed

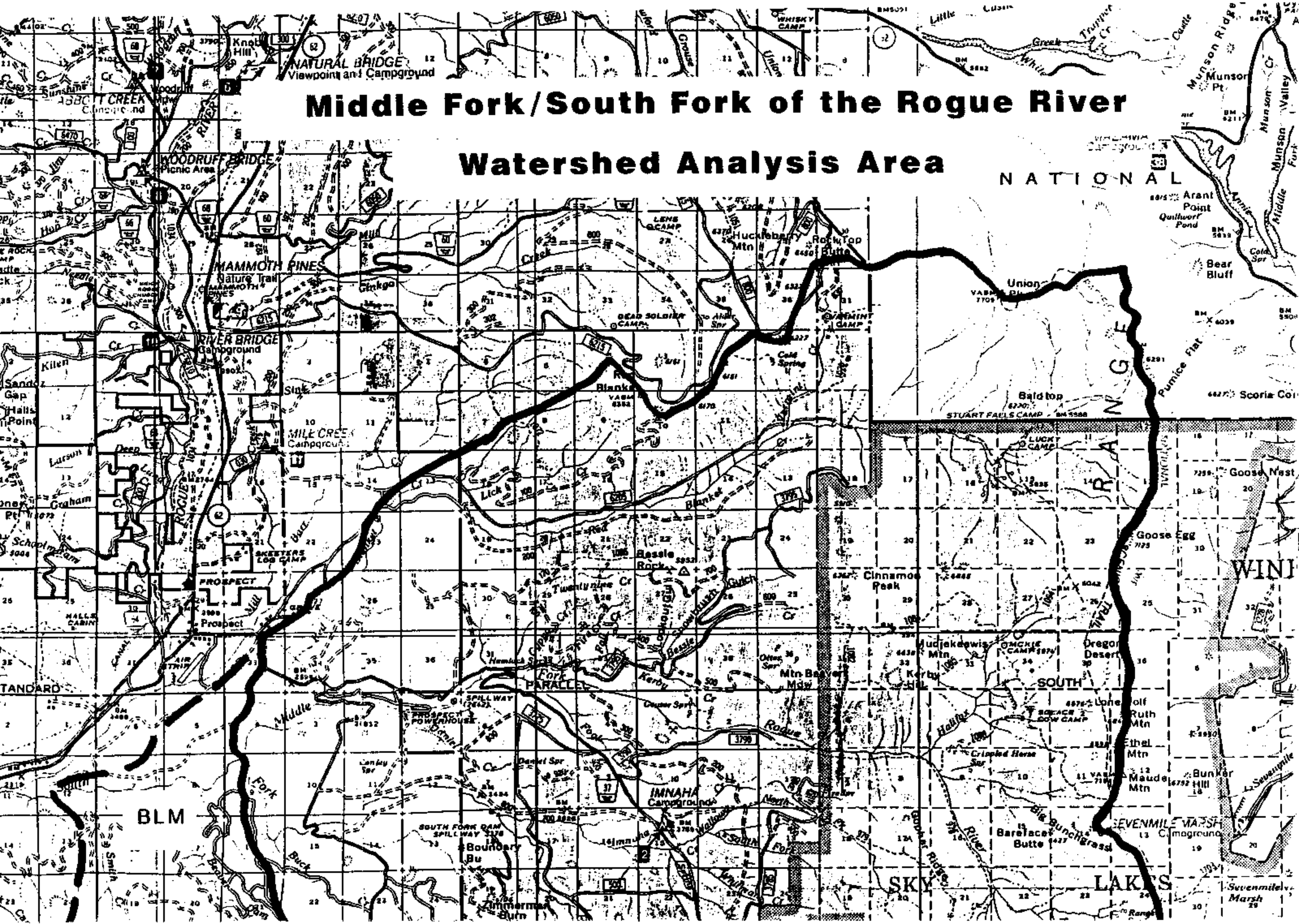
Water Quality of Lakes and Streams
Wide Range of Vegetative Conditions
Sky Lakes Wilderness Area
Fire Management and Risk
Road Density, Access and Use
Habitat Connectivity along the Cascades
Ground Water and Soil Conditions

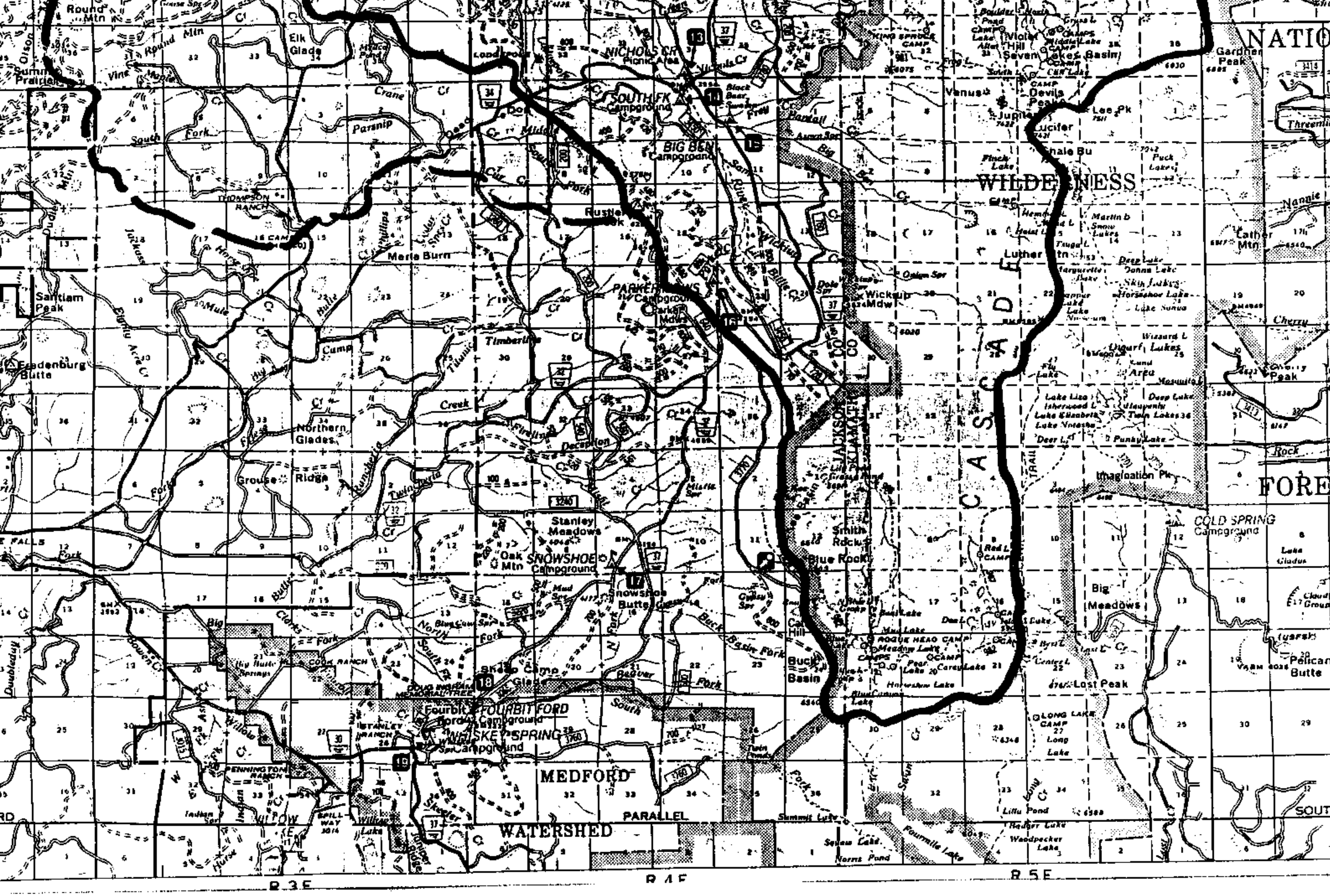
## Management Allocations of the Watershed

Wilderness
Late-Successional Reserve
Riparian Reserves
Matrix
Big Game Winter Range
Developed Recreation

## Key Topics and Issues

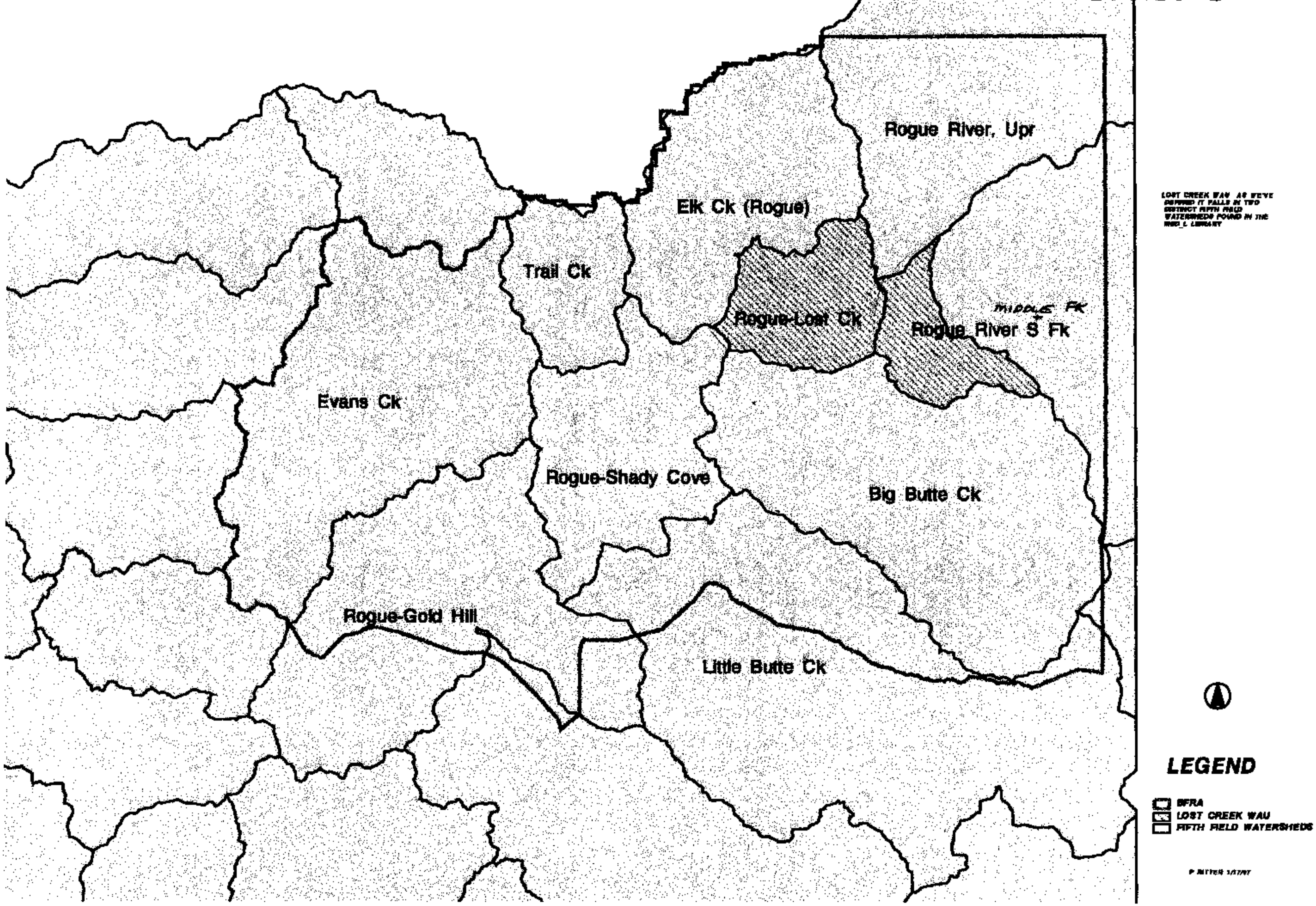
**Fire Risk** in the Watershed.
Prescribed Natural Fire in the Wilderness.
**Late-Successional Vegetation** across the Watershed.
**Road Density** in the Watershed.
Roads for management Use and Visitor Access.
Habitat Corridors for Dispersal.
Habitat Needs for the Function of **Connectivity**.
Future **Wilderness Use** and Access.
Maintenance of **Water Quality**.


Middle Fork/South Fork of the Rogue River
Watershed Analysis Area
NATURAL BRIDGE
Viewpoint and Campground
WOODRUFF BRIDGE
Picnic Area
MAMMOTH PINES
Nature Trail
RIVER BRIDGE
Campground
MILE CREEK
Campground
PROSPECT
Prospect
Huckleberry Mtn
Rocky Top Butte
Union Peak
Baldtop
STUART FALLS CAMP
NATIONAL
Arant Point
Bear Bluff
Munson Pt.
Scoria Cone
Goose Nest
Goose Egg
Cinnamon Peak
Bessie Rock
Mudjekeewis Mtn
Kerby Hill
Oregon Desert
SOUTH
Lone Wolf
Ruth Mtn
Ethel Mtn
Maude Mtn
Bunker Hill
SEVENMILE MARSH
Campground
Seven Mile Marsh
Boundary Bu
IMNAHA
Campground
BLM
SKY
LAKES
WINI
STANDARD
PARALLEL
PROSPECT POWERHOUSE
Twentynine Cr
Mtn Beaver Mdw
Bareface Butte
Big Bunchgrass
Middle Fork
Rogue
Kilen
Graham



NATIO
WILDERNESS
FORES
CASCADE
Round Mtn
Elk Glade
NICHOLS CR Picnic Area
SOUTH FK Campground
BIG BEN Campground
Seven Lakes Basin
Devils Peak
Lee Pk
Lucifer
Gardner Peak
Thompson Ranch
Santiam Peak
Merle Burn
Rustler Peak
PARKER MDWS Campground
Wickiup Mdw
Luther Mtn
Cathe Mtn
Eradenburg Butte
Northern Glades
Grouse Ridge
Stanley Meadows
Oak Mtn
SNOWSHOE Campground
Snowshoe Butte
Smith Rock
Blue Rock
JACKSON CO
KLAMATH CO
Imagination Pk
COLD SPRING Campground
Big Meadows
Pelican Butte
Lost Peak
Buck Basin
Cook Ranch
Sheep Camp Glade
Fourbit Ford
FOURBIT FORD Campground
WHISKEY SPRING Campground
Stanley Ranch
Pennington Ranch
Long Lake Camp
Long Lake
Lilly Pond
MEDFORD
WATERSHED
PARALLEL
Summit Lake
Fourmile Lake
Woodpecker Lake
Willow Lake
R 3 E
R 4 E
R 5 E

# LOST CREEK W.A.U. AND FIFTH FIELD WATERSHEDS



# APPENDIX B
# ENVIRONMENTAL HISTORY OF THE FORKS WATERSHED

ENVIRONMENTAL HISTORY
of the

**"FORKS" WATERSHED ANALYSIS AREA**

J.LaLande, 6/97
C.R. Job RR-1119

**Introduction**

The Middle Fork/South Fork of the Rogue River watershed analysis area (also referred to as the "Forks WAA" in this narrative) has been used by human beings for several thousand years. However (and particularly in comparison to adjacent and other, generally similar watersheds in the southwestern Oregon vicinity), most of the Middle Fork/South Fork drainage has been relatively lightly affected by human activities for most of its history. Only within the past fifty years has human modification of the Forks watershed's landscape become a significant, landscape-scale factor, and most of that modification has been concentrated within the watershed's lower-elevation sections.

The Setting: For the purposes of the following discussion, the Middle Fork/South Fork watershed is divided into a "lower" section and an "upper" section. The lower watershed reaches from near the confluence of the two forks, near the town of Prospect (about 2,500' a.s.l.), to about 4,500' in elevation. The upper section includes the remainder of the drainage, extending to elevations in excess of 7,000 feet; all of the watershed's portion of Sky Lakes Wilderness is located within the upper section. In a very general sense, the lower section includes the bulk of the watershed's mixed-conifer forest, and the upper section consists largely of true-fir, true-fir/mountain hemlock, and lodgepole pine forest. Most of the Forks WAA is within the Rogue River National Forest, with well under one-quarter of the WAA managed by the Bureau of Land Management or privately owned. (The following narrative concentrates on the history of the National Forest portion of the watershed.)

As is the case for adjacent drainages within the Cascade Range, vulcanism during the Pleistocene Epoch (or Ice Age) has dominated the formation of this watershed's landscape. The lowest point in the watershed--the confluence of the two forks--is deep within a narrow, steep-walled basalt gorge. The highest point, Devil's Peak, is the glacially-scoured remnant of a late Pleistocene volcano that provides a dramatic panoramic view of much of southwestern Oregon and northernmost California. In between these two places, massive layers of andesite and basalt comprise the bulk of the watershed's geology, helping give most of the area (exclusive of the river gorges in the lower section, the glacial canyons of the Middle Fork and Red Blanket Creek in the upper section, and a few major volcanic peaks) its generally gentle/rolling topography. At certain places in the highest elevations of the watershed, glaciation and deposition of Mazama pumice (the latter occurring about 7,000 years ago) probably served to "subdue" a landscape that formerly had steeper relief.

Although it may be somewhat misleading--given the presence of places such as the steep "U-shaped-valley" of Middle Fork Canyon--to characterize the Forks's watershed as "gentle," the overall area is far less broken by steep relief into separate sub-drainages than are relatively nearby watersheds (e.g., Elk Creek WAA, Little Butte Creek WAA) of the upper Rogue River system. However, the Forks WAA--aside from a few scattered meadows and other small openings--is (and apparently long has been) much more uniformly covered by conifer forest than are these nearby watersheds. Grassy "balds," oak savanna, open oak/pine transition forest, and extensive mixed-conifer-forest/meadow mosaics are all vegetation communities that are notable by their absence from the Middle Fork/South Fork watershed. The Forks WAA's "deep forest" character (with its scarcity of numerous opening/ecotones) may have counterbalanced the area's gentle topography in terms of attracting/discouraging human activities within the watershed. Compared to other watersheds in the Cascade Range part of the Rogue River National Forest, the Forks WAA has been among the "least used/least inhabited" areas of the Forest.

**Prehistory and Native Groups (ca. 10,000 years before present to A.D. 1865)**

Early Prehsitoric Period: The first human beings in southwestern Oregon--people whom archaeologists call the "Paleo-Indians"--probably arrived about 11,000 years ago, at the close of the Ice Age. The Paleo-Indians very likely would have hunted mammoth, giant bison, and other now-extinct mammals within the Middle Fork/South Fork of the Rogue River watershed.

Although very few archaeological sites within southwestern Oregon have yielded Paleo-Indian artifacts (and these few sites contain only "surface finds" of isolated artifacts: "Clovis"-style fluted projectile points), one of those sites is situated within/adjacent to the Forks WAA, near Medco Ponds. Thus, Paleo-Indian presence within the watershed is virtually certain. More hypothetically, the severe, centuries-long drought that is thought by some archaeologists to have characterized the end of the Pleistocene (between about 11,500 and 11,000 years ago) in the Pacific Northwest may have resulted in a much different kind of forest (with more meadows and other extensive openings) within the watershed during that period than has been present in subsequent centuries. Vegetation communities present during the terminal Pleistocene "drought" conceivably could have provided sufficient forage for herds of large mammals, and thus Paleo-Indians would have been attracted to the vicinity for hunting.

Later Prehsitoric Period: As floral and faunal communities characteristic of the Ice Age disappeared, the human inhabitants of southwestern Oregon began nearly ten-thousand years of adaptation to changing opportunities offered by the land. Within the Middle Fork/South Fork watershed, extensive archaeological survey accomplished during the 1970s-90s suggests that prehistoric human presence was light in comparison to nearby watersheds. Documented aborginal sites within the Forks WAA are few, and most of these are very small, sparse lithic-scatter sites or isolated artifacts. (Note: On a "sites-per-acre" basis, the Forks WAA has the fewest known archaeological sites of any comparably sized portion of the Rogue River National Forest.) Most of the nearest winter villages, based on both archaeological and ethnographic data, were located well outside the watershed, along the main stem of the Rogue River downstream from the Middle Fork/South Fork gorge (i.e., beneath the waters of present-day Lost Creek Lake reservoir) or possibly as far upstream as Prospect (about a mile northwest of the Forks WAA boundary). Archaeological sites documented within the Forks WAA (i.e., the small lithic scatters) probably represent recurrent but short-term seasonal occupation by small groups of hunter/gatherers.

Native Resource Uses: During the many centuries of human prehistory after the Pleistocene, it is possible that the Forks WAA was typically visited by only a few, small, widely dispersed groups during any given year. These groups would have resided during the winter at the above-mentioned village sites, outside of the watershed; they would have ranged intermittently through parts of the Forks WAA during the period between late spring through early autumn. Fishing likely was never very important within the watershed, especially in comparison to the sizeable anadromous fishery of the main stem of the Rogue River below Prospect (as well as anadromous fish runs on the lower stretches of major tributaries such as Elk Creek, Big Butte Creek, and Little Butte Creek). Small populations of native trout, as well as limited runs of salmon and steelhead in the lowermost sections of the Middle Fork and South Fork, may have provided food to some native anglers, but the volume of catch would have been dwarfed by that of adjacent drainages. (The river-borne Mt. Mazama ash deposits of about 7,000 years ago likely would have caused a severe decline in fish populations for much of the upper Rogue system for years or decades after the cataclysmic eruption; deep ash deposits within the lower South Fork canyon indicate that the Forks WAA would have experienced this effect.)

Most hunting probably focused on deer and elk. The Klamath people are known to have regularly hunted deer (using fire to help drive the animals) on the west side of the Cascade crest during late prehistoric/early historic times, and their ancestors may have done so for centuries previously. Other prey would have been taken as available: Small numbers of pronghorn antelope (historically documented for Crater Lake National Park) occasionally may have been present in the upper watershed; bighorn sheep (known to have been resident in small numbers in the Cascades to the south) could have ranged within the upper watershed as well.

Gathering of edible plants certainly took place within the watershed. Sugar pine nuts, chinquapin nuts, hazel nuts, serviceberries, and huckleberries are all available as widely dispersed resources. However, the watershed's comparative lack of low/medium-elevation openings meant that camas bulbs were not nearly as abundant as elsewhere, nor were acorns available in appreciable numbers. (Note: It is possible that another period of major vegetational changes--associated with the "Altithermal" drought period of about 7,000-4,000 years ago--resulted in increased quantities of edible staples within the watershed, but this hypothetical increase could well have been even more plentiful within other drainages of the upper Rogue River system, making them far more attractive as resource-gathering areas to native people than the Middle Fork/South Fork watershed.)

The Forks WAA contains no deposits of obsidian, cryptocrystalline silicate, or other good-quality toolstone. Aboriginal travel routes through the area likely followed drainage divides rather than canyon bottoms; a few routes probably provided regular trans-Cascadian access (for example, via Seven Lakes Basin or Blue Canyon Basin). Spiritual uses of the watershed would have included visits by Klamath youths and shamans to prominent high-points and to mountain lakes for solitary power quests.

Ethnographic Groups: During late prehistoric and early historic times, the Middle Fork/South Fork watershed would have been included within the overlapping resource-gathering territories of the Upland Takelma, the Southern Molalla, and the Klamath peoples. Following the defeat and removal of Rogue River native groups (including the Takelma) by Euro-American settlers in 1856, Klamath groups (who resided in winter villages located east of the Cascade Range crest) briefly became the sole native users of the area. This traditional use ended with the Klamaths' "confinement" to the Klamath Reservation in 1863. Most traditional native uses of the Forks watershed effectively ended at that time.

__Landscape__ __Appearance__ __prior__ __to__ __Euro-American__ __Settlement__: It is almost certain that for much of the last 3,000-4,000 years (i.e., since the end of the "Altithermal"), the forests of the Middle Fork/South Fork watershed were subject to repeated fires. The forests likely were significantly more open than they became by the mid--to-late twentieth century, and the mixed-conifer community would have contained more fire-resistant trees (large-diameter ponderosa pine and sugar pine, in particular). The few major openings within the watershed's forests would have been larger in size than at present, and they would have contained no non-American exotic/"invader" species of plants.

Fire would have been a determining factor in the landscape's appearance, but the origin of most fires was probably lightning. Unbdoubtedly, over the course of several thousand years, the natives' use of fire for vegetation and wildlife management purposes indeed affected portions of the Middle Fork/South Fork watershed--as it did many other areas of southwestern Oregon. However, it is problematic, at least in the case of this particular watershed, whether anthropogenic fire was truly a major factor in prehistoric landscape character and appearance. Given the area's relatively high elevation and the apparent scarcity of low-elevational communities such as grassy savanna and oak/pine parkland during recent centuries, it seems likely that natural fire was far more important (at least on an acreage basis) than human-set fire. Unlike some nearby areas (such as the Elk Creek and Little Butte Creek watersheds, where oak groves and pine parklands were important components of the landscape), anthropogenic fire within the Forks WAA probably was a determinant only in certain favored, relatively small higher-elevation areas (i.e., huckleberry patches that also harbored large game in the late summer). Natural fire--including relatively infrequent, stand-replacement fires in mid-to-high elevation forests--would have been the dominant force in the Forks WAA.

**Early Euro-American Uses and Nearby Settlement (ca. 1820s-1900)**

__Trapping__ __and__ __Exploration__: The first Euro-Americans to explore southwestern Oregon arrived in the late 1820s: fur trappers of the British-owned Hudson's Bay Company. Because the Middle Fork/South Fork watershed was not prime beaver habitat compared to other drainages in the vicinity (i.e., due to high-gradient streams and lack of large quntities of aspen/alder/poplar), early-day beaver trapping probably rarely if ever occurred within the watershed. (Later in the nineteenth century, trapping for fur-bearers such as marten and fisher certainly took place within the area; however, such trapping was done by local-area residents working in solitude, not by the itinerant brigades of trappers passing through the region during the H.B.C. era.) Given the watershed's remoteness from major routes of earliest trans-Cascade travel, it may be that the first Euro-Americans to actually penetrate and explore the Forks WAA did not arrive until the mid-1850s at the earliest.

__Initial__ __Local__ __Settlement__: Euro-American agricultural settlement of the Rogue River Valley and adjacent areas began simultaneous to the discovery of gold in the Siskiyou Mountains in 1852-53. Farmers settled on Donation Land Claims in the main valley during the early 1850s; they began grazing their livestock during the summers within the high-elevation ranges of the Cascade Range. Some herds of cattle and sheep undoubtedly were grazed within the Forks WAA during the 1850s-1870s, with most of this activity occurring within what is now Sky Lakes Wilderness (i.e, at Solace Meadow, McKie Meadow, etc.) and at the few primary range locations at lower elevations (e.g., meadows located at what is now Medco Ponds and at the site of "Mill-Mar" Ranch). But, as with so many other human activities, the amount of grazing within the watershed was probably significantly less than in nearby watersheds.

During the 1870s-1880s, as prime farmlands in the main Rogue River Valley settled up and increased in price, small-scale agriculturalists (sometimes referred to as "mountain ranchers") began to homestead in more remote locations of the Rogue drainage--including along the upper Rogue River from Trail Creek to about Prospect, and in the upper Big Butte Creek drainage. These families grazed small herds of stock, cut sugar pine shakes for sale in the Valley, grew small vegetable gardens, and generally followed a mixed "subsistence" /market-economy lifestyle. Some of these people would have hunted game and picked huckleberries within the Forks WAA, and a very few of them may have had summer-use cabins at lower elevation meadows (e.g., later site of Mill-Mar Ranch) that provided shelter when herding their livestock. Aside from the so-called "Red Blanket Ranch," extremely few if any of the "mountain ranchers" actually settled within the watershed, which was truly a "hinterland of a hinterland."

Early Historic Resource Uses: Other than the making of sugar pine shakes, the watershed's timber resource was untouched during this period. Very small-capacity, family-run sawmills--cutting lumber for local use--operated near present-day Propsect and Butte Falls during the late nineteenth century, but no logging would have occurred within the Forks WAA. Transportation within the watershed would have been entirely by foot or by horseback along various trails. The main trans-Cascade wagon routes in southwestern Oregon lay well to the north (i.e., Crater Lake Road) and south (Rancheria Road, Dead Indian Road) of the Middle Fork/South Fork watershed.

Early-day grazing within the watershed is attested to by names such as Rustler Peak and McKie Meadow (said to be named for a turn-of-the-century Klamath Indian sheepherder). During the late nineteenth century, place names such as Parker Meadows and McKee Basin were given (both memorializing individuals who settled in the Big Butte Creek area). Another Big Butte creek resident, Lee Edmondson, trapped within the Forks WAA; he is said to have given names to Imnaha Creek, Wallowa Creek, Sumpter Creek, and Whitman Creek because that vicinity reminded him of the northeastern corner of Oregon. Cat Hill was named for the mountain lions that fed on settlers' livestock. In 1897, one of the last grizzly bears of southwestern Oregon, a notorious cattle-slayer called the "Cat Hill grizzly," met its end there when hunted down by ranchers. Red Blanket Creek received its name in about 1863 (apparently for the reddish hue of the native hay in the late summer); the "Red Blanket Ranch" was one of the largest "mountain ranch" operations in the vicinity; it was located on the western edge of the Forks WAA. The water rights for irrigating this property date to 1889. (Note: This is the only water right for any stream within the entire Forks WAA listed in the 1919 Rogue River Water Rights Decree; this fact emphasizes the sparse and impermanent character of human uses of the watershed through the early twentieth century.)

**Landscape Appearance/Condition by 1900**: In summary, most human uses of the Middle Fork/South Fork watershed between about 1855 and 1900 were seasonal activities of short duration and relatively light impact. The single significant exception would have been large fires set in order to improve grazing forage. Federal forester John Leiberg, visiting the Forks WAA in 1899, described the timber of Township 33 South, Range 5 East as "badly burned and...fire-marked throughout...about 2,500 or 3,000 acres of the township have been transformed from forest into a huckleberry patch." For Township 34 South, Range 4 East, Leiberg remarked that the "central portions have been utterly laid waste" by recent fires, and he documents many west-facing slopes as covered with "impenetrable thickets of chapparal." Leiberg does not specify whether some or many of these fires were actually human-set, but he does underline in other sections of his report that arson was a major factor for similar sections of the Cascades.

A human origin (i.e., set for creating short-term grazing areas) certainly seems likely for at least some of the watershed's burned areas. Actual grazing (particularly by sheep), as opposed to fires set to improve the range, likely had major effects only in small areas, but there is no documentation available as evidence of this condition. Hunting pressure eliminated most elk from the watershed by the 1890s; grizzlies were extirpated by the same time, but a few wolves apparently remained in the high country into the early decades of the new century.

**Federal Land Management and Expanded Use (ca. 1900-1940)**

Continued Sparse Settlement of the Vicinity: The decades following 1900 brought steadily increasing, if still quite limited, use of the Middle Fork/South Fork watershed's resources. The growth of the towns of Prospect and Butte Falls (the latter founded at a commercial sawmill in 1905), to the north and south of the Forks WAA respectively, led to larger numbers of nearby residents. Some of these people visited the watershed for hunting, fishing, berry picking, and other actvities. By 1910, a crude wagon road had been extended north from Butte Falls to the E. G. Silsby property on Buck Creek; the rugged South Fork Canyon halted extension of this road (the route of the present-day Butte Falls-to-Prospect Highway) until nearly fifteen years later. By 1915 or so, the Silsby property had become known as the Zimmerman Ranch (more recently known as the Mill-Mar Ranch); a little over a mile to the south was the Daley Ranch (present Medco Ponds). Along with the Red Blanket Ranch, these properties were the only "permanent" settlements within or immediately adjacent to the Forks WAA during the early twentieth century.

Federal Agencies: Crater Lake National Park was established by Congress in 1902; the National Park Service, however, was not formed until 1915. The Crater (later Rogue River) National Forest was established by presidential proclamation in 1906. Forest Service rangers arrived in the area that year to build trails and fight fires. (Previous to this, the larger Cascade Forest Reserve, which included the Forks WAA, was very lightly administered by a Dept. of Interior ranger force.) In 1907, the Forest Service built a major trans-Cascade packtrail (with stumps low enough to enable wagon travel over some sections) between Prospect and Pelican Bay (Upper Klamath Lake). This route closely paralleled the South Fork of the Rogue (not far from present-day roads 37 and 3775) for much of its length. The Forest Service also developed guard stations at Lodgepole and Imnaha before World War I. Following the extreme fire season of 1910 (during which the "Cat Hill" and "South Fork" fires burned several thousand acres in the Forks WAA), the Forest Service established fire lookouts at Bessie Rock (hence the place-names "Lookout Gulch" and "Kerby Hill"), Devil's Peak, Rustler Peak, and elsewhere in the vicinity.

Timber Values and the "Homestead Boom": With the advent of large-scale railroad logging operations elsewhere in Oregon during the early twentieth century, the timber resources of the Forks WAA began to increase in speculative value. "Dummy" homestead claims, timber-and-stone claims, and outright purchase of timberland in the lowest elevations of the Forks WAA by a number of individuals during 1900-1910 led to the consolidation of these properties under the ownership of the Rogue River Timber Company. For the most part, this transfer of timberland to private ownership took place outside (immediately to the west) of the present National Forest boundary (in the area a few miles to the east and south of Prospect).

One exception to this pattern was Section 16, T33S, R4E, W.M., a parcel along Imnaha Creek that passed from federal control to ownership of M. J. McDonald by 1910. In 1912-15, a group of about a dozen would-be "homesteaders," perhaps spurred on by the success of Mr. McDonald, claimed adjoining parcels within the lower South Fork drainage (T33S, R4E, located between Fool Creek and Imnaha Creek)) under terms of the "Forest Homestead" (or "June 11, 1906") Act.

Forest Service land examiners found that all the claims were virtually worthless for agricultural purposes, but the claimants kept up a lengthy battle to obtain ownership to the potentially valuable timberland. By 1916, all the claims but one had been rejected by the government. The lone hold-out, an elderly German immigrant named August Vogt, finally had his claim rejected in 1918 (as a result of his "enemy alien" status during World War I). (With the exception of Vogt's claim, apparently none of these claims had involved actual construction of a cabin or any other improvements on the land.)

<u>Logging and Other Resource Uses</u>: The watershed's timber resources, although recognized to be of potential economic value, were located too far from the nearest railroad access points to warrant commercial logging during this period. Thus, while the woods of the Big Butte Creek drainage immediately to the south echoed to the whistle of Owen-Oregon/Medco steam locomotives during the 1920s-30s, the timber of the Forks WAA simply "added volume." (Proposals for extending a logging railroad into the area and on north toward Union Creek were discussed during the early 1920s, but no surveys were done.) A very small amount of commercial logging (serving a very local market only) probably took place on the private lands closest to the little town of Prospect.

As for mining, no valuable mineral resources were located within the Forks WAA; although early twentieth-century gold and manganese mining took place in the Cascade Range not more than twenty miles to the northwest and southwest respectively, the "economically valueless" volcanic deposits of the Middle Fork/South Fork watershed attracted no prospectors.

The value of the Middle Fork and the South Fork of the Rogue River, for both hydroelectric generation and irrigation, led to water development during the 1930s. The California-Oregon Power Company ("COPCO") built small dams across both the Middle and South Forks in 1932, diverting water to supply its new power generation facility on the main stem of the river, downstream from Prospect. (This development eliminated the few anadromous fish from the watershed.) In the Seven Lakes Basin, at the headwaters of the Middle Fork, the Soil Conservation Service established one of the first formal snow survey courses in the nation (1936), measuring the moisture content of the winter snowpack so as to forecast the Rogue River Valley's summer irrigation supply.

<u>Transportation Developments</u>: During the early 1920s, the Forest Service built a surfaced route, called the "Lodgepole Road," eastward from its junction with the road that connected Butte Falls with the Zimmerman Ranch on Buck Creek to the north. The Forest Service road reached Lodgepole Guard Station; from that point a crude dirt wheeltrack was extended about three miles to the South Fork of the Rogue. Forest Service trails and telephone lines radiated out from Lodgepole Guard Station and Imnaha Guard Station (which was not accessible by road for a few years yet), linking the watershed to a Forest-wide communication and transportation network. By 1925, the Butte Falls county road was finally extended all the way past the Zimmerman Ranch to Prospect. Completion of this road (the antecedent to the present Butte Falls-Prospect Highway) involved some major construction across the South Fork and Middle Fork canyons.

(The Prospect-to-Middle-Fork portion of this county route had been developed by about 1917.) During the late 1920s the Forest Service then built a connecting "loop" road (the "Imnaha Road") that extended east from the county road up the South Fork drainage to Imnaha Guard Station; from there it continued southward and linked to the Lodgepole Road on the upper South Fork. A final "key" Forest Service transportation route in the watershed was finished in the mid-1930s, when Civilian Conservation Corps crews built the "Parker Meadows Road" northward from the well-settled vicinity east of Butte Falls to a junction with the above-mentioned roads at the South Fork, not far upstream from the mouth of Nichols Creek.

(Thus, by 1936, much of the basic route of present-day FS Road 37 through the Forks WAA had been developed; only the northernmost portion, crossing the lower Middle Fork, awaited the post-WWII era.) The C.C.C. also built new administrative structures at Lodgepole and Imnaha (as well as a new lookout at Blue Rock, at the end of a new, long ridge-crest road) at this time.

Recreational Development and Uses: By the late 1920s, the only formal Forest Service recreational facilities within the Middle Fork/South Fork watershed were campgrounds at Imnaha Creek and on the South Fork. The C.C.C. improved these small sites during the 1930s and built other very modest developments at Nichols Creek and Parker Meadows. Deer hunting and the annual huckleberry crop continued to bring local residents into the area each fall. The new road access also brought area families into the watershed to enjoy camping and fishing in a pristine setting--located far from the Rogue Valley's summer heat, along cool tree-shaded streambanks.

One of the most pristine sections of the watershed was located along the Cascade Range's crest, at the headwaters of the Middle Fork and South Fork. Numerous small lakes in the glacially-carved scenic setting had been planted with trout by at least the 1920s. A few people hiked or rode horses into places such as Seven Lakes Basin and Blue Canyon Basin to enjoy backcountry recreation. In 1932, the Forest Service proposed setting aside 3,000 acres of the Seven Lakes Basin for backcountry use; this was approved as an "Unusual Interest Area" in 1934. During the 1930s, the C.C.C. improved numerous trails (including the Oregon Skyline Trail) through what is now Sky Lakes Wilderness. They also constructed rustic "trail shelters" at popular berry-picking or fishing locations such as Lucky Camp, McKie Camp, Grass Lake, and Wickiup Meadow.

**World War II and After (1940-1980s)**

Logging Arrives in the Watershed: The high lumber demand of World War II ushered in the Middle Fork/South Fork watershed's logging era. Initially, timber harvest was confined almost exclusively to private (e.g., Rogue River Timber Company) lands just south and east of Prospect. Caterpillar tractors were employed extensively on the "flat"-to-moderately sloping terrain of this area. Many logs (particularly ponderosa and sugar pine) were hauled by truck to Medford for processing at various Valley mills. Additionally, a number of small-capacity mills operated during and immediately after the War near Prospect, some of them specializing in making Douglas-fir railroad ties (the huge increase in war-time rail traffic after the slow years of the Depression necessitated replacement of vast quanities of ties). During the 1940s, Medford Corporation extended its logging railroad northward from Butte Falls into the lower South Fork drainage (Beaver Dam Creek, upper Buck Creek), with logs hauled by rail to the company's mill in Medford. By the mid-1950s, with the post-War housing boom, most private timberlands in the watershed had been heavily cut.

National Forest timber began to be harvested in the late 1940s. The 3,000-acre Rustler Peak sale (to Southern Oregon Sugar Pine Co.) of 1948 included some sections within the Forks WAA. Selective "cat logging" of large-diameter pine and Douglas-fir on the flatter ground of the South Fork drainage took place during the lumber boom years of the 1950s. Also during that decade, Forest Service timber roads were built well up Red Blanket Creek (present FS road 6205), up Bessie Creek drainage (present FS road 3795), on the slopes of Rustler Peak (a spur system that is now closed), into the headwaters of the Imnaha Creek drainage (present FS roads 3780 and 3785), and across the lower Middle Fork canyon (present FS road 37). By 1961, over fifty Forest Service timber harvest units, many of them clearcuts, were scattered along the expanding road system within the lower and middle elevations of the Forks WAA. Many of these units were concentrated in the western part of the Middle Fork drainage and on the northeast slopes of Rustler Peak.

During the early 1960s, the lower South Fork road (present FS road 3775) added nearly six miles of major timber-haul road to the watershed, between Green Creek and the Daniel Spring vicinity (following approximately the same route as the 1907 Prospect-Pelican Bay trail). Over the course of the 1960s and 1970s, the current Forest Service road system was all but completed--with extensive timber harvest units (largely shelterwoods by the 1970s) logged along all of the roads. By the early 1980s, a few timber-access roads had reached up to the 5,500-foot elevation and Road 37 had been paved for its entire length through the Forks WAA.

Simultaneous to the impacts of large-scale timber harvest, the long-developing effects of decades of fire suppression had led to substantial changes in forest structure and species mix by the 1980s. Replanting of timber harvest units with single or a few desired conifer species during the 1960s-70s also contributed to vegetational change. Even with the widespread roading and logging of the 1940s-80s, however, many lower-elevation sections of the Forks WAA (e.g., along the South Fork) retained a "heavily forest" appearance. In 1993, much of the Forks WAA was designated as a "Late Successional Reserve" under the Northwest Forest Plan.

## Backcountry Recreation and Wilderness

In contrast to the lower- and middle-elevation sections of the watershed, roads did not penetrate the highest portions of the Middle Fork/South Fork watershed. High construction costs and lower-value timber played a major part in this situation. However, the area's backcountry recreational value also contributed to its "roadless" character. (In the mid-1920s, the National Park Service had seriously considered internal proposals to acquire the Cascade Range crest from Union Peak south to Mt. McLoughlin as an addition to Crater Lake National Park.) In 1946, the Forest Service identified the Seven Lakes Basin and the Blue Canyon Basin as "Limited Areas," where roads were to be excluded. However, the crest zone between these two areas remained open to road construction. (In 1940, the C.C.C. had extended a Christmas-tree-cutting route--the "Hemlock Road"--past Aspen Spring; shortly after the end of the War one hardy local resident drove his military surplus Jeep past the terminus of this road and supposedly succeeded in crossing the Cascade Range crest.) The recreational popularity of this roadless, backcountry area--which came to be known as "Sky Lakes"--grew substantially with the "backpacking" boom of the late 1960s. Due in large measure to vocal lobbying by the area's recreational constituency, the Forest Service identified Sky Lakes as a "wilderness study area" in 1972; Congress conferred formal wilderness status on it in 1984. Since 1972, motorized vehicles have been prohibited from the area, which stretches along the crest from Crater Lake National Park to beyond the summit of Mt. McLoughlin.

Within Sky Lakes Wilderness, decades of high-impact camping on the shores of a few popular lakes had led to severe loss of ground cover and other vegetation by the 1970s. During the 1980s, lakeshore closures, revegetation efforts, designated horse camps, and other measures have been instituted in order to restore the heavily used lake basins to a natural condition. Although concentrated recreational use had visible impacts, the area's water quality remained extremely high; an Environmental Protection Agency acid-rain study of lakes in the Western United States found some of Sky Lakes lakes to have remarkably chemically pure water.

The Pacific Crest National Scenic Trail, extending from Canada to Mexico, was completed through Sky Lakes by about 1980; the PCNST regularly brings people through Sky Lakes Wilderness who may live long distances away. During the 1960s-70s, with the expansion of herds of transplanted elk, elk hunting returned as an important activity within the Forks WAA. Much of this activity is concentrated in the northern portion of Sky Lakes Wilderness and adjacent areas.

Outside of the wilderness, recreational use of the Middle Fork/South Fork watershed tends to be the object of an almost exclusively local (i.e., Jackson County) clientele; these people continue to focus on hunting and on camping at traditional campsites. Hiking/mountain biking along the new South Fork Trail (constructed in the 1980s-90s) is becoming a popular pastime.

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# APPENDIX C
# FIRE AND FUELS REORT
# FORKS WATERSHED

**FIRE AND FUELS REPORT**
**FORKS WATERSHED**

Fire and fire suppression policies have had major influence on shaping vegetation and associated species. Fire is one of the primary disturbance factors in this watershed. Desired future conditions that increase high intensity stand replacement fires must be evaluated and weighed before implementation.

**Fire Behavior and Potential**

Fire behavior and potential is somewhat less severe in the Forks Watershed area as compared to Elk Creek or the Siskiyou Mountains of southern Oregon. Vegetation, weather/climate and topography are three factors that influence fire behavior. Following is a discussion of these factors.

Topography plays a major role in fire behavior. The South Fork, Middle Fork, and Red Blanket drainages are narrow bottom canyons with steep side walls. Slopes exceeding 60 and 70% are common. This factor alone contributes to potential large fires. Topography outside these drainages is rather gentle and rolling which do not pose any specific suppression difficulty. The upper reaches of these drainages are within the Sky Lakes Wilderness where access is limited and suppression actions are difficult.

The weather/climate factor that has the largest effect on fire behavior is the Pacific High Pressure. This pattern sets up during late June and continues through late September or early October. This system forces storms and moisture north of the watershed. Precipitation averages 35 to 60 inches per year with occasional summer lightning storms. Typical storms produce multiple fire starts with enough moisture to generally allow suppression forces to control these fires. Occasional dry storms exceed suppression force capabilities such as the one that occurred during August of 1987. Fire starts from these storms are normally concentrated along high points and ridge tops. Accessibility is an issue when multiple starts occur in the wilderness which often delay suppression action.

Temperature ranges from an average high of 75 degrees in June to 85 degrees in August. Potential for large stand replacement fires exist when high temperaturs and strong winds funnel through the steep canyons. Fire behavior is less severe on gentle slopes unless a significant wind event occurs in conjunction with high temperatures and low humidities.

Vegetation is another key component that contributes to fire behavior. Generally this environment favors the true fir plant series. While White Fir is the most common series, it grades into Shasta Red Fir at higher elevations and Douglas Fir and Ponderosa Pine at lower elevations. The large range in elevation creates a broad variation in plant series. Fire has played an active role in these vegetation conditions. Several stand replacement fires and numerous small fires have created diverse vegetation patterns ranging from early to late seral conditions.

**Historical Perspective**

Fire return intervals average 44 years with a low of 11 years on south and southeast aspects to a high of 126 years on north and northeast aspect[1]. Not all of these occurances resulted in stand replacement fires. Many were low intensity "underburn types" which explains the existance of large old growth trees that exceed 300 to 400 years of age. Recent stand replacement fires exist as brush fields today and older burn areas exist as second growth early seral forests. These return intervals are based on records dating from 1550 to 1935. After that date fire suppression became an overiding influence on fire behavior and vegetation conditions.

**Current Conditions**

Fuel Models

Fuel Models were derived using vegetation condition classes contained in the Cascade Zone Geographical Information System. Each condition class is represented by a Northern Forest Fire Lab fuel model[1]. These models are part of the Behave Fire Prediction and Fuel Modeling system[2] 2 This program predicts fire spread rate and flame length based on weather, fuel and topographic conditions.

The major fuel models for the Forks Watershed area are 8,10 and 11. Fuel model 11 consists of light slash. Fires can be very active in this model as fine needles and limbs provide ample fuel to maintain combustion. Light thinning or partial cutting of conifer stands with no slash treatment create this fuel condition. Spacing of fuels, shading from overstory or aging of fine fuels can limit fire potential. There are 3,160 acres of model 11 within this area. Aggressive slash treatment within harvested areas has kept the acres in this fuel condition relatively small. The majority of Forks Watershed consists of fuel model 8. This is a closed canopy timber model of short needle conifers or hardwoods. Slow burning ground fires with low flame lengths are generally the case although fire may encounter an occassional "jackpot" of heavy fuels and flare up. Only under severe weather conditions involving low humidities, high temperatures and strong winds do these fuels burn with high intensities. Much of the model 8 fuels are the result of previous harvest entries with aggressive slash treatment. There are 86,942 acres of model 8 fuels. Fuel model 10 has the most potential for large fires within this watershed. This model is characterized by large amounts of down 3 inch and larger limbwood resulting from overmaturity or natural events such as the snowdown/blowdown event of January of 1996. Crowning, spotting and torching are frequent fire behavior parameters encountered in this fuel model. This leads to potential suppression difficulty. Potential for large stand replacing fire exists on steep slopes of Red Blanket, Middle Fork and South Fork drainages where model 10 fuels exist. See Fuel model map.

**Fire Hazard**

Fire Hazard as used here is defined as difficulty in suppression. It is described through fire behavior predictions of flame length and spread rate. Flame length is the major measurement of fire intensity and is divided into categories of 0 to 4 feet, 4 to 8 feet and 8 feet and above. Fires in the 0 to 4 feet range can generally be suppressed using direct attack methods by persons using hand tools. Hand firelines should hold the fire. Resource effects from these 0-4 ft fires are described as "underburns" where ground fuels are consumed while much of duff layer is maintained.

Those in the 4 to 8 feet range are to intense for direct attack. Handline cannot be relied on to hold the fire. Equipment such as dozers, engines, and retardent aircraft can be effective. These fires are generally underburn type but occur under conditions that allow torching of individual trees and exposure of some mineral soils. Fires that exceed 8 foot flame lengths present serious control problems. Control efforts at head of the fire will probably be ineffective. Many times suppression action may wait until more favorable weather conditions exist. These are described as "stand replacement fires" where tree canopies are destroyed and duff is consumed exposing mineral soil on much of the area. All these conditions can occur on any one fire depending on aspect, slope and weather conditions.

To determine fire hazard on the Forks Watershed fuel model, aspect and slope were each assigned point values based on their effect on fire behavior. Below is a listing of point values assigned.

Slope:
0-20% = 5 points
21-45% = 10 points
46+ = 25 points

Aspect:
North 0-68 and 315-360 degrees = 5 points
East and West 68-315 and 293-315 = 10 points
South 135-293 degrees = 25 points

Fuel Models:

Other (water, rock) = 0 points
Model 8 = 10 points
Model 10 = 25 points
model 11 = 15 points

Hazard rating was determined using the following point ranges:

0-25 low hazard
26-45 moderate hazard
46+ high hazard

Using GIS, hazard areas were mapped and acreages determined. The Forks Watershed area has 23,456 acres of high hazard, 72,014 acres of moderate hazard and 33,917 acres of low hazard. In addition there are 769 acres of rock or water where no hazard exists.
See fire hazard map.

**Risk Analysis**

To determine fire risk man caused and natural ignitions were studied. The area was divided into high, medium, and low risk zones based on actual fire occurance (see fire occurance map) over the 35 year period from 1960 to 1995. The highest risk zones were ridge tops in the Red Blanket, Middle Fork and South Fork drainages.

**Hazard/Risk**

Hazard and risk zones were combined to show 9 areas of combined hazard and risk which are:

| | Acres |
|---|---|
| Low hazard/low risk | 16,344 |
| Low hazard/moderate risk | 10,505 |
| Low hazard/high risk | 7,055 |
| | |
| Moderate hazard/low risk | 33,469 |
| Moderate hazard/moderate risk | 24,292 |
| Moderate hazard/high risk | 14,221 |
| | |
| High hazard/low risk | 9,418 |
| High hazard/moderate risk | 10,525 |
| high hazard/high risk | 3,509 |

This hazard and risk combination helps managers prioritize areas for hazard reduction. The areas of high hazard and high risk for this watershed are the canyons of Red Blanket Creek and Middle Fork and South Forks of the Rogue River.

**Fire Risk and Management**

Historical fire events and past management practices provide insight for future management of this watershed. Fire exclusion has allowed a fuels buildup and thus increased potential for large damaging fires. Key questions need asked relative to management of fire within this watershed

**What is the current risk of wildfire in this watershed?**

Fire risk was determined by analysis of fire starts both human and mancaused. The primary fire cause is lightning which concentrates on ridge tops. Mancaused fires were located near recreation sites and timber sale areas. In the 35 years that were examined ( 1960-1994) there were an average of 7.4 fires per year. This is low to moderate risk when compared to interior valley watersheds within the Rogue basin. More important is the location of these fire starts. Current direction requires full suppression within this LSR. A fire start in the steep (60 to 85% slope) Red Blanket Canyon on a hot (90 degree) August day has potential to burn the entire drainage.

**What role has fire played in the ecosystem of the watershed?**

Fire has had a major role in shaping vegetation patterns. Historical fire return intervals range from 11 to 126 years. The entire watershed has burned at some time in the past. Burns ranged from small spots to large acreage fires leaving a mosaic of vegetation patterns. Due to fire exclusion multi-storied stands are developing (fuel model 10) and thus increase the potential for catastrophic crown fires. This trend will continue unless a managed fuel treatment program is instituted.

**What effect do the late successional objectives of LSR have on fire risk?**

A more appropriate question might be: What effect does increased fire risk have on LSR objectives. The overriding objective for management in this LSR is to develop late successional conditions. In developing these conditions ladder fuels and overall biomass increase which when burned in a wildfire situation can cause severe resource damage. Thus, there is potential for detrimental effects to the soils, water, wildlife and vegetation resources in the LSR.

**What would be the effect of using fire in the management of this watershed.**

Fire use is appropriate to maintain Desired Future Conditions (DFC) and enhance forest health within this watershed. Prescribed burning under controlled conditions should be implemented. Burning would bring fuel conditions to a more natural level. In addition to burning mechanical treatment is appropriate to reduce this fuel loading. In some areas fuels are heavy enough to warrant repeated entries to reduce tonnages in stages. Treatment areas should be strategicially located on ridge tops and south slopes to enhance suppression success when a fire occurs. The entire area should be treated using various fuel treatment methods over time. The National Environmental Policy Act (NEPA) process will be used to insure integration of all resource objectives for any proposed fuel reduction projects.

**Findings**

The desired future condition (DFC) as stated in the South Cascades Late Successional Assessment is to maintain 75 percent of the area in a late successional vegetation condition with no more than 28 percent in the high fire hazard condition. Assuming the DFC for this watershed is the same as for the LSR then based on the analysis presented this watershed meets the DFC for fire hazard conditions. Only 18 percent of the area is considered high hazard. Prior to designation of LSR lands many of these acres were harvested with extensive fuels treatment. This is at least a partial explanation for the small amount of land considered to be high hazard.

**Future Considerations**

The Skylakes Wilderness Fire Plan is in the development stages. This plan will evaluate a full range of alternatives that will allow reintroduction of fire to return the wilderness to a more natural condition. The wilderness portion of the Forks Watershed should be managed under the direction provided in this plan.

Fuel models were based on vegetation condition classes. These fuel models should be ground verified when evaluating any specific project proposals.

1 South Cascades Late-Successional Reserve Assessment. April 1998. Table 22 pg 79

2 Andrews, Patricia L. "BEHAVE": Fire behavior predicition and fuelmodeling system - Burn subsystem, Part 1. INT-GTR-195; 1986.

# APPENDIX D
# MIDDLE FORK/SOUTH FORK ROGUE INSECT AND DISEASE CONDITIONS

MIDDLE FORK/SOUTH FORK ROGUE
INSECT AND DISEASE CONDITIONS

Insects and pathogens are active in the Middle Fork/South Fork Rogue Watershed. They are two of the disturbance agents that cause changes in forested ecosystems. They can act alone, together in "complexes", or with other disturbances such as fire, wind, or timber harvest. Their impacts are greatly influenced by their origin (native versus exotic), tree species composition in affected stands, host ages, and history of other disturbances.

Insects and pathogens affect ecosystem functions and conditions by physically altering or killing their host trees. This leads to changes in forest species composition and successional pathways, influences tree size, canopy cover, and stand structure, creates wildlife habitat, affects nutrient cycling, and influences fire behavior. Effects may be subtle or dramatic; insects and pathogens can influence the landscape, stand, or individual trees. Whether their effects are perceived as beneficial or detrimental is dependent upon management objectives, desired future conditions, and scale of activities.

Insect and disease activity in the Middle Fork/South Fork Rogue Watershed probably has increased since the turn of the century as a result of fire exclusion, introduction of exotic organisms, and extensive management activities. Most influential have been increased stocking levels, changes in species composition, soil disturbance and compaction, creation of wounds and stumps, and lack of coevolved resistance mechanisms.

CURRENT CONDITIONS

A wide variety of insects and diseases occur throughout the Middle Fork/South Fork Rogue Watershed. Those whose effects are most noticeable include three root diseases, several bark beetles, white pine blister rust, and several species of dwarf mistletoes.

**Root Diseases and Associated Bark Beetles:**

The three most significant root diseases occurring in the watershed are laminated root rot, caused by Phellinus weirii, Armillaria root disease, caused by Armillaria ostoyae, and Annosus root disease, caused by the "S" strain of Heterobasidion annosum. All are considered diseases of the site; inoculum may remain viable in the wood of infected roots for 20 to 50 years. Their spread rates are slow, averaging one to two feet per year. Effects include growth loss, butt rot, predisposition to bark beetle attack, and mortality. Root diseases tend to be overlooked because of the subtle nature of their impacts; however over the long term, their effect on growth and survival is much larger than that of virtually any other agents.

Laminated root rot occurs throughout the watershed. Individual tree vigor does not influence infection; where susceptible host roots come into contact with viable inoculum, infection will take place. Small trees die standing. They are quickly killed and do not have enough crown mass to cause them to be windthrown. Larger trees may fall over, their rotted root systems evident, or they may die standing as a result of bark beetles that preferentially infest weakened trees. Root disease-created openings may be colonized by susceptible conifers which fail to reach large size, by less susceptible conifers which maintain the fungus on the site, or by hardwood trees and shrubs which are immune and thus foster the slow disintegration of inoculum in infected conifer root systems.

Recruitment of down woody material tends to be high in laminated root rot pockets. Large, standing dead trees exist on the perimeters of pockets; however their unstable root systems cause them to fall over more quickly than snags created by other agents.

At low to mid elevations in the watershed, laminated root rot is usually found in small pockets (from less than one acre up to 5 acres in size) where Douglas-fir and grand fir in all size classes are killed. Douglas-fir and white fir are highly susceptible and are readily infected and killed. Shasta red fir and western hemlock are often infected but rarely killed. The pines and incense cedar are considered tolerant; they are seldom infected and almost never killed. All hardwoods are immune.

At higher elevations, laminated root rot causes medium to large-size openings (one acre to 50 acres). In stands with high components of mountain hemlock, laminated root rot plays a key role in promoting species and structural diversity. Mountain hemlock and white fir are readily killed. Shasta red fir, and subalpine fir are often infected but not readily killed. Lodgepole pine, western white pine, and whitebark pine are seldom infected and almost never killed.

Armillaria root disease is also commonly found in stands throughout the Middle Fork/South Fork Rogue Watershed. Its primary impacts are causing tree mortality and predispositioning trees to bark beetle attack. All conifers are hosts to this pathogen. White fir, Shasta red fir and Douglas-fir are highly susceptible and discrete pockets of mortality often result. In most cases, pockets are small, usually a few acres or less in size. Several large Armillaria root disease pockets, affecting approximately 140 acres, occur in the area east of Road 37 by Whitman Creek. In isolated locations, other species, such as sugar pine, western white pine, ponderosa pine and incense cedar, are readily killed. Armillaria root disease is usually associated with trees under stress or where man-caused disturbance is evident. Stumps created after logging can become colonized by this fungus, becoming effective food bases from which the fungus colonizes living trees. Soil compaction from ground-based equipment can also exacerbate existing conditions. Off-site plantings are particularly vulnerable to infection and mortality.

The impact of annosus root disease across the watershed is unclear. The fungus is present in large true firs and hemlocks where it causes butt rot. In mature mountain hemlock stands, 50% or more of the trees may have significant amounts of decay in the butt log caused by H. annosum. While tree mortality is rare in this situation, stem breakage is common. True fir and hemlock stumps are also infected. Tree mortality from annosus root disease alone is rare; it was observed in only a few scattered locations in the watershed. Occasionally small understory firs in close proximity to infected stumps are found infected. In other parts of the Pacific Northwest it has taken 10-15 years after true firs are harvested before the effects of annosus root disease are readily observed, and it has been found that levels of infection and mortality are much greater when true fir stands have been entered more than once. It may be that annosus root disease on the Middle Fork/South Fork Rogue has not developed sufficiently for large tree mortality to occur and/or that annosus root disease effects are being masked by other agents such as bark beetles and Armillaria root disease before its signs become obvious.

**Pine Bark Beetles:**

Mountain pine beetle, Dendroctonus ponderosae, and Western pine beetle, Dendroctonus brevicomis, occasionally attack pines that are stressed by root disease. However, infestation is more strongly correlated with low host vigor resulting from overstocking. Larger trees (greater than 8" diameter) are preferred, and the beetles will kill trees in small pockets. Stand basal areas greater than 120 square feet per acre are high risk for moderate sites. High sites can maintain slightly higher basal area accumulations before they are at risk for bark beetle infestations. Competition among trees and shrubs of all species, not just the pines, contributes to pine susceptibility.

Pine bark beetles are currently active in the Middle Fork/South Fork Rogue Watershed; western pine beetle is found infesting ponderosa pine and mountain pine beetle is found attacking all pine species including ponderosa, lodgepole, western white, and sugar pines. Although numbers of recently-killed trees are low in comparison to mortality that occurred in the late 1980s and early 1990s, many stands are still at high risk due to heavy stocking levels resulting from fire exclusion.

**OTHER BARK BEETLES**

Bark beetles such as Douglas-fir beetle, Dendroctonus pseudotsugae and the fir engraver beetle, Scolytus ventralis, are commonly associated with root disease-infected trees. When acting this way, these beetles are secondary agents that are attracted to weakened trees. They maintain their endemic populations by attacking root disease-weakened trees inside and on the perimeters of root disease centers.

In recent years, fir engraver beetle-caused mortality has been observed that not only involves root diseased trees, but is rather associated with drought stress, particularly in heavily stocked stands.

Small pockets of snowdown/blowdown can be found in the watershed resulting from recent winter storms. These pockets are mostly made up of downed true firs, yet some contain downed Douglas-fir. Douglas-fir beetle populations can increase in response to sudden increases in numbers of downed trees following windstorms. Mortality in surrounding trees often occurs when more that three Douglas-fir trees per acre greater than ten inches in diameter are downed and remain protected from heat extremes for a year following the windthrow event.

**White Pine Blister Rust:**

Since its introduction to the west coast of the United States, white pine blister rust, caused by the fungus Cronartium ribicola, has been responsible for mortality of five-needle pines throughout their range. In the Middle Fork/South Fork Rogue Watershed, white pine blister rust attacks sugar pine, western white pine, and whitebark pine. The fungus causes topkill and tree mortality and may also predispose trees to attack by bark beetles. Environmental conditions for spore survival and infection are good and adequate populations of the alternate hosts, Ribes spp. exist throughout the watershed. White pine blister rust infections are common. High hazard locations where high levels of mortality may occur are found on large flats or streamsides where moist conditions generally prevail or on saddles or ridgetops where fog and clouds linger in the fall. Higher elevation sites in the watershed are particularly vulnerable and the long term survival of wild type five-needle pines is questionable in these locations. Where western white pine provides large tree structure in root diseased mountain hemlock stands the effects of white pine blister rust may be of great importance.

**Dwarf Mistletoes:**

Dwarf mistletoes, Arceuthobium spp. are parasitic plants that infect conifer species. Results of infection include growth loss, topkill, distortion, mortality, and predisposition to infection and attack by other agents such as Armillaria ostoyae and various bark beetles. Seeds are projected from plants and land on and infect susceptible hosts. Infection is favored by multi-layered canopies. Damage is greatest when the growing tops of trees are infected. Branch brooming resulting from dwarf mistletoe infection provides important habitat for a variety of birds and small mammals. Dwarf mistletoes are common on Douglas-fir, the true firs, lodgepole pine, mountain hemlock and western hemlock in the watershed.

**Stem Decays:**

Phellinus pini, the cause of red ring rot is commonly found in mature and overmature Douglas-fir, Shasta red fir, white fir, ponderosa pine, sugar pine, and western white pine in the watershed. It causes a severe stem decay and is responsible for considerable cull and breakage. Echinodontium tinctorium, the "Indian Paint Fungus", causes rusty red stringy rot of grand fir and western hemlock. Mature and overmature trees are severly culled and often break. Suppressed understory trees loacted below infected overstories are often infected. The infections will remain dormant until they are activated by wounding. These heart rots provide excellent conditions for excavation by cavity nesting birds.

## FUTURE TRENDS

Laminated root rot pockets will continue to increase in size; mortality of highly susceptible species will continue to occur. Armillaria root disease impacts will continue to increase, particularly in true firs in areas of past or future ground-based logging. Effects of annosus root disease will probably become more visible in stands where true firs and hemlocks were logged in the past and in those stands where future logging of these species occurs and stumps remain untreated.

Bark beetles will continue to infest true firs and Douglas-firs that are infected by root disease pathogens. Mortality of non-root disease infected trees will occur during periods of environmental stress, such as future droughty periods. Mortality of green standing Douglas-fir caused by buildup of populations of Douglas-fir beetle will most likely occur in areas of concentrated Douglas-fir blowdown.

Bark beetles will continue to kill the dominant and codominant ponderosa, western white and sugar pines wherever they occur unless stocking levels are reduced. Lodgepole pines in mixed and pure stands will become vulnerable to mountain pine beetle attack when trees reach 80 years old and six to eight inches in diameter.

White pine blister rust will continue to infect five-needle pines. Impacts will be greatest on moderate to high hazard sites. Regeneration on these sites will have low survival rates; older infected trees will develop dead tops, branch dieback, and be more vulnerable to attack by mountain pine beetle. Without stocking control to maintain larger trees, fire to provide conditions for pine regeneration, and rust resistance in the population, five-needle pines may be eliminated from some sites.

Larger diameter dwarf mistletoe-infected trees will continue to provide important habitat components for small mammals and birds while their growth is slowed and their risk of mortality increases. The stress caused by dwarf mistletoe infections will make these individuals more susceptible to attack by secondary insects and pathogens. Young trees that are infected, particularly those growing beneath infected overstory trees of the same species, will not reach a large size; continued infection in their tops and intensification within the crown will cause these trees to die at an early age.

**RECOMMENDATIONS**

Reintroduce fire to the watershed. Fire is an important regulator of stocking. It helps to control dwarf mistletoe. Fire creates conditions favorable for regeneration of root disease-resistant trees.

Root disease conditions (incidence, severity, and impact) of planning areas within the watershed should be assessed prior to conducting future management activities within those planning areas.

> In general, discriminate against root disease-susceptible species in areas of known root disease.
>
> In stands younger than 25-years-old where greater than ten percent of the area is determined to contain root diseased trees, avoid thinning unless root disease-susceptible species can be discriminated against in favor of root disease resistant species. Consider planting root disease-resistant species in openings created by root disease.
>
> In stands older than 25-years-old where greater than 25 percent of the area is in root disease, do not conduct intermediate entries. Consider planting root disease resistant species in openings created by root disease.
>
> Where true firs and hemlocks are to be managed in the future, take particular care to avoid soil compaction. Consider stump treatment for annosus root disease when true firs and hemlocks are harvested and it is desired to manage those species in the future.

To maintain large pines, reduce or eliminate competing vegetation in an area around each tree 10 to 25 feet beyond the crown dripline. In stands with high pine components, reduce stand-level stocking to below high risk basal areas. Thin ponderosa pine plantations when diameters reach eight inches dbh. Treat slash to reduce infestation by <u>Ips</u> beetles.

Conduct white pine blister rust hazard analyses prior to planting. Use rust resistant western white pine and sugar pine stock on moderate and high hazard sites. Assess rust status in existing stands. Consider impacts of thinning as related to rust increase prior to activity. Consider pruning stands for rust prevention. Develop a management plan for deploying rust-resistant stock in high elevation stands, particularly areas impacted by laminated root rot. Conduct an analysis of rust status in whitebark pine stands.

Consider managing dwarf mistletoes when understory trees are growing under same-species infected overstories. If infected overstories must be maintained, concentrate infected trees low on slopes, in riparian areas, or away from same species understories. Consider planting different species under and around dwarf mistletoe-infected overstory trees.

For further information or assistance regarding insect and disease conditions in the Middle Fork/South Fork Rogue Watershed, please feel free to contact the Southwest Oregon Forest Insect and Disease Technical Center at 541 858-6126.

Ellen Michaels Goheen
Plant Pathologist.

# APPENDIX E
# SOILS - FORKS WATERSHED ANALYSIS

# SOILS

## FORKS WATERSHED ANALYSIS

The following report consists of information taken from the RRNF SRI and the Jackson County Soil Survey Report. The first section lists and describes the Environmental Zones recognized in this survey. The second section lists the Landtypes and Complexes with their components. The third section describes the Soils and/or Landtypes and their characteristics including discussions of observed past management and its effects on "productivity and sedimentation" plus observed cumulative effects on the soils and sites from other activities or management practices.

### ENVIRONMENTAL ZONES

The Cascade portion of the Forest is occupied by four environmental zones. Of these four zones, two are dominant in terms of area and influence while the remaining two are relatively small. The two most important zones in the Cascades are the Principal and Upper Forest Zones together occupying about 80 percent of the area. The Sub-Alpine Forest Zone occupies about 15 percent of the area in the Cascades while the Lower Forest Zone occupies only about 5 percent of the area. This latter zone is recognized as having particular management significance but, due to the small area which it occupies, management interpretations consider it in and along with the Principal Forest Zone. The new Ecological Unit Inventory currently being done on the Forest will cut this area out and be of much greater detail than this original mapping.

Principal Forest Zone is dominated by mixed conifers and has 40 to 55 inches of precipitation in the form of rain and wet snow. The soil moisture regime is estimated to be Xeric (dry) and the estimated soil temperature regime is frigid (cool). It ranges in elevation of about 3000 to 4500 feet. There are 3 sub-divisions differentiated based on vegetation and soil drainage in the Cascades and 3 in the Western Cascades.

Upper Forest Zone is dominated by true fir and Mountain Hemlock conifers, has 55 to 70 inches precipitation in the form of snow and rain, and summer thunderstorms. The soil moisture regime is estimated to be udic (moist) and the estimated soil temperature regime is frigid (cool). The elevation ranges from 4500 to 6000 feet.

Sub-Alpine Forest Zone is dominated by Mountain Hemlock and Shasta Red Fir, has 55 to 70+ inches of precipitation in the form of winter snow and summer thunderstorms. The estimated soil moisture regime is udic (moist) and the estimated soil temperature regime is cryic (cold). Elevations range from 6000 to 7500+ feet.

LANDTYPES AND COMPLEXES WITH THEIR COMPONENTS

Landtypes: 10, 10-H, 11, 11-H, 12, 12-H, 13-H, 14, 15, 16, 17, 17-A, 18, 19, 20, 20-A, 21, 22, 26, 26-H, 30, 31, 32, 34, 35, 35-H, 42.

Complex Landtypes with their compositions:

| | | | | | | |
|---|---|---|---|---|---|---|
| 112 | - 60% | LT 11 | and 40% | LT 12 | | |
| 113-H | - 70% | LT 11-H | and 30% | MU 3 | | |
| 123-H | - 65% | LT 12-H | and 35% | LT 13-H | | |
| 132 | - 55% | LT 13 | and 45% | LT 12 | | |
| 132-H | - 55% | LT 13-H | and 45% | LT 12-H | | |
| 133 | - 50% | LT 11 | and 50% | LT 33 | | |
| 145 | - 70% | LT 14 | and 30% | LT 15 | | |
| 167-A | - 50% | LT 16 | and 50% | LT 17A | | |
| 171 | - 60% | LT 17 | and 40% | LT 21 | | |
| 173 | - 60% | LT 17 | and 40% | LT 22 | | |
| 173A | - 65% | LT 17A | and 35% | MU 3 | | |
| 174A | - 65% | LT 18-A | and 35% | MU 4 | | |
| 198 | - 55% | LT 19 | and 45% | LT 18 | | |
| 202 | - 60% | LT 20 | and 40% | LT 12-H | | |
| 203 | - 70% | LT 20 | and 30% | MU 3 | | |
| 223 | - 65% | LT 22 | and 35% | MU 3 | | |
| 236 | - 60% | LT 23 | and 40% | LT 36 | | |
| 236H | - 60% | LT 23 | and 40% | LT 36H | | |
| 239 | - 60% | LT 23 | and 40% | LT 39 | | |
| 239H | - 60% | LT 23 | and 40% | LT 39H | | |
| 317A | - 50% | LT 17-A | and 50% | MU 3 | | |
| 325 | - 60% | LT 32 | and 40% | LT 35 | | |
| 326 | - 60% | LT 32 | and 40% | LT 36 | | |
| 369(H) | - 60% | LT 36(H) | and 40% | LT 39(H) | | |
| 432 | - 50% | LT 43 | and 50% | LT 32 | | |

Miscellaneous Units:

1, 3, 4, 5, 6, 7

## Key Questions

ISSUE: **Soil Productivity** is a key component of vegetative conditions and ecosystem health. Many of the soils within the watershed are very vulnerable to loss of sustainability and productivity.

1. How much of the watershed is in a condition of site productivity degraded by human caused activities? Where has this occurred in the watershed?

Based on monitoring, 60+ percent of the land administered by the Forest Service has had productivity levels degraded on it within this Analysis area. This has occurred by topsoil displacement and or compaction. The major impacts are on areas where ground based systems were used to harvest timber, treat fuels and prepare the site.

The major problem to soil productivity is the management activities have exceeded Soil Standards and Guidelines for sustainability of productivity and not that the soils had trees removed. Its been the method utilized and its intensity for the removal, treating the fuels and preparing the site that has negatively affected soil productivity.

2. What measures can be taken to restore/rehabilitate these distrubed sites?

The sites generally need site specific prescriptions for restoration however they are generally lacking in organic matter in and on the soil. Compaction needs to be eliminated and erosion needs to be curtailed. No one method is acceptable for the various types of soil and landscape conditions. Soils where drainage has been altered need a vegetative type conversion analysis.

3. What is the current status of woody material by site?

Areas machine piled or windrowed etc are very poor in their woody material of all sizes. Burned areas range from poor to acceptable depending on the burn intensity. Monitoring has rated it marginal or less in many areas. Most important are the pumice and sandy soils of the flats. These areas have been severely impacted by equipment. South aspects generally have low woody material and they are considered critical areas.

4. Where are natural disturbances occuring through the processes of mass-wasting and erosion?

See the geology report on mass-wasting. Erosion is primarily occurring in areas where water is allowed to concentrate, often due to the restricted internal drainage from compaction, and on bared surfaces for whatever reason. Sandy soils tend to gully which is easier to see and the silty or clayey soils have more of surface flow (melt and flow) which is harder to see.

5. What are factors affecting restoration efforts on disturbed sites?

Soil texture, drainage, permeability, structure, inherent fertility, soil climate and waterholding capacity. These combined with slope and aspect etc. determine restoration practices and chances for success. Another major factor is affecting restoration efforts is the lack of soil scientist time to map and design the prescriptions for restoration.

6. What is the role of woody material in maintenance of soil productivity?

Woody material maintains surface stabilization; its a source of material for nutrient cycling; food for the soil microbial population, and it increases soil waterholding capacity by 200 to 800 percent when broken down.

7. What are natural soil densities, woody material levels?

Natural bulk densities of the Pumice soils range from 0.5 to 0.7 gm/cc, soils derived from the basaltic material range from 0.7 to 0.9 gm/cc and soils from the western cascade pryoclasitic materials range from 0.7 to 1.0 gm/cc An increase of the natural densities by 15 to 20 percent is detrimental to plant growth.

Woody materials are highly variable. The Plant ecologists have information about natural levels of woody material.

8. What activities affect soil biology and soil chemistry - and what are the effects? Where do the activities occur? I have added soil physics to this list.

Soil biology, chemistry and physics act both independently and collectively to create soil characteristics that determine "Soil Productivity". Productivity is the ability of a soil to yield vegetation (crops).

It is estimated that 90+ percent of the soil chemical and biological activites occur within the top 12" of soil due to food, moisture and air relationships. This is the zone most adversely impacted from disturbance and compaction. Disturbance is the soil removal and compaction slows the air and water transmission rates and root respiration.

Before talking about the activities which affect soil biology, chemistry and physics (mechanics) we need to first identify the three characteristics and their relationship remembering each is a study within itself. Soil biology is the living, both plant and animal, populations within the soil. Each type functions somewhat differently. They utilize the existing organic matter as energy and tissue building material. The populations are sensitive to temperatures, aeration (both aerobic and anaerobic conditions), and moisture conditions (saturation etc.). They are the primary factors in nutrient cycling and organic (humus) development. Soil chemistry is generally related to the fertility characteristics of the site. It is dependent on the parent material of the soil, the clay content, the humus content, vegetative regime etc. These give the soil its ability to supply and or hold the nutrients.

Other chemical soil characteristics relate to the soils ability to tie-up nutrients thus making them unavailable to plants. The soil physical characteristics important to soil productivity are the structure, texture, mineralogy, etc. Soil structure is altered by mechanical forces and organic characteristics and affects the infiltration rates, permeability, aeration, etc. which directly affect productivity. Texture relates to soil infiltration and permeability rates which determines aeration and water holding capacities. It also relates to nutrient holding capacity for the fertility levels.

The surface soil (topsoil) is where most of the biological and chemical activity occurs. It is the major zone of root development, carries most of the nutrients for plant use and supplies a large portion of the water used by plants. It is easily altered by management activities yet is extremely important to maintaining productivity of the soil. Research has shown that as much as 80 to 90 percent of the productivity can be attributed to the topsoil.

The productivity of a soil is determined in a large degree by the nature of its subsoil. It is much less active and provides less of the nutrients and water to plants than the surface soil however it is the zone that carries the plants over during times of stress etc. If its permeability or structure is altered it may affect the rooting capability of the plants through aeration or lack of aeration and increased resistance (strength of soil) to rooting. This sometimes changes the suitability of the existing vegetation through stress and die-off.

Management activities that affect the soils productivity characteristics are listed below. They are based on observations I have made from working in this area and informal monitoring in and around this study area. Effects of the impacts are taken from research conducted in the Pacific NW and SW.

TRACTOR LOGGED - MACHINE PILED - WINDROWED AREAS

Tractor logging:

The use of tractors for logging has created the potential for compacted soils over various percentages of the site. This compaction comes about on areas used for skidding. Primary roads and landings are impacted the most. Monitoring has shown that both of these as well as secondary skid roads exceed Regional standards and guidelinesfor percent of increase in bulk density for the soils measured. FLMP standards and guidelines limit the percent of area compacted to 10 percent of the area except in certain situations. Communication with FIR revealed that adequate skidding could be done if 3 percent of the area was dedicated to skid trails.

Machine piling:

Machine piling with tractors has been used for reducing slash, removing competing vegetation and/or create planting spots. This activity has generally been done without consideration for its cumulative effect on the percent area compacted. Machine piling with the tractors create additional compaction and also removes surface soil (topsoil) and places it in the piles. Generally piling creates the same compactive effort as found on primary and secondary skid trails. The biggest variability is the percent of area piled and the amount of material piled. Piles commonly occupy 10 to 20 percent of the area and scarified areas make up 80 to 90 percent of the piled area. The combination of compaction and surface soil removal can be very severe to a soils productivity.

Windrowing:

Windrowing is the systematic piling of brush in rows and is very similar to machine piling but generally covers 100 percent of the area. Little windrowing has occurred in this area. Soil compaction and surface soil removal are the detrimental effects. Interwindrows occur on about 80 percent of the area and the windrows occupy 20 percent. The compaction is often comparable to a primary skid road.

CABLE HARVESTED AREAS

High-lead yarding:

This system of logging has had the most detrimental effect on the soils of all the cable yarding systems. It does not suspend the logs rather it drags them from the unit to the landing which is in a cone shape. This allows soil gouging whenever the log is dug into the soil and near the landing the soil is 100 percent scalped of its surface soil.

Gouging which is the scalping of the surface soil within the unit may have various effects depending on the localized topography and soil characteristics. They need to be analyzed as to the current condition and effect on productivity and potential for erosion for reaching drainages. The percent of surface soil loss near landings needs to be assessed because it depends on the units shape, number of yarder settings etc.
Gouging reduces the soil productivity.

Skyline yarding:
This type of cable yarding has various forms. Generally the yarding is not detrimental to the soils productivity except in isolated pockets if the logs did not have suspension and/or created trenches up and down the slope.

## POST SALE ACTIVITIES AND OTHER ACTIVITIES

These take on many different forms and need to be assessed as to the soils potential or resiliency for various effects.

In the above activities the following ties need to be made to soil productivity which is the Issue. In general, compaction effects the soil biology by reducing the macropore space, and changing the air and water relationships within the soil. Soil displacement and removal effects the soil biology by removing the source for food, and altering the air and water relationships.
In general compaction effects the soil chemistry by changing the water movement within the soil and can change to anaerobic conditions which create a different chemical reaction. Soil removal or displacement changes the soil chemistry by removal of the highest nutrient (elements) source and the material that hold the nutrients in place. It changes the water holding capacity.
Compaction alter the soil physical characteristics by changing the structure to massive or breaks down the structure which in turn slows the exchange of air and water into and within the soil. Displacement or removal generally alters the soil physical conditions by destruction of the structure.

I have made the following general observations in this area which should be taken into consideration in project designs:
South exposures or aspects are very slow to recover from burning or any other management practices.
Soils erode easily if exposed.
Woody material of all sizes is critical for maintaining surface stability.
Tremendous gully erosion has occurred where runoff has concentrated in channels.
Soil organic matter is slow to accumulate.
There is a need to start longterm soil restoration practices from old management practices.

Monitoring by others have shown indications of:
Hot burning has reduced % organic matter by 90%.
Hot burning reduced total nitrogen by 80%.
Second year studies showed:
Soils with 35 to 70% coarse fragments had 24% seedling survival.
Soils with 70 to 100% coarse fragments had 16% survival.
These give an indication for the need to address the concerns.

Research has shown the following related to effects on growth from compaction and displacement:

Steinbrenner - plants on skid trails have shallow root systems brought about by reduction in macroscopic pore space, lower permeability and reduced oxygen capacity of soil.

Youngbery - D.fir leader growth of seedlings show a 43 percent reduction from a undisturbed cutover area to the tractor skid trail.

BLM - Terminal leader growth of 8 year old D.fir was reduced 57 percent on tractor skid roads from undisturbed sites.

Froelich - Height growth loss of 24 to 53 % depending on species, degree of compaction and soil type.

Minore - D.fir showed a 20.4% increase in soil bulk density decreased total weight by 50% and shoot weight by 58%.

Lanspa - in the Klamath Mountains showed an average tree height reduction of 61.7% from a undisturbed area to a main skid road.

Hatchell, Ralston, Foil - secondary skid trail reduce height growth by 20.8% over an undisturbed site.

All past management activities need to be assessed as to their impacts on soils productive capabilities prior to new management activities on the particular soil-site. Rehabilitation or restoration measures are extremely slow and rarely restore a site to full potential. Impacts are long term or permanent so alternatives or mitigation measures need to be discussed and planned for all management activities. In addition, the Cumulative Effects on the soils need to be addressed. Such things as the effect of multiple past entries and the relationship of runoff from roads and from burning or how they interact to create erosion in the depositional soils and positions.

9. What activities (and where) affect soil chemistry and soil biology (micro) and what are the effects?

See the section above on what activities. Other factors are decreasing temperature, water, and food supplies reduce and or stop the soil chemical and biological activities. Each of these is affected by the management activites described above.

10. How does grass affect the soil? (Where and how much?)

Conifers have a more symbiotic relationship with fungi while grass is more symbiotic with bacteria. Pine is more tolerant to the grass habitats. Burning increases soil pH which favor grass vegetation due to the release of bases such as Calcium, Magnesium and Potassium.

Grass has a granulating effect on the soil surface due to its fibrous rooting habit. Early season grasses tend to start growing early and can utilize all the moisture before the lower soil temperatures reach optimum temperatures for root growth.

DESIRED FUTURE CONDITIONS (DFC)

AND

MANAGEMENT RECOMMENDATIONS

DFC:

The soil at its productive potential and handles precipitation without eroding the surface nor creating cumulative effects off-site. Management activities are based on soil/site factors.

RECOMMENDATIONS:

Analyze existing conditions and design new projects to maintain or restore soil productive characteristics.

Develop and monitor new mitigation measures for activities.

Develop restoration practices for soils that have been adversely impacted from previous management activities as well as natural impacts.

Continue inventoring data on soils, landforms and vegetation.

DFC:

Restoration in progress on soils with degraded productivity characteristics.

RECOMMENDATIONS:

Continue soil restoration needs inventory portion of the WIN.

George Gadura
RRNF Soils Scientist

Characterization of the Watersheds for Soils and Landforms

Soils and landforms within this watershed: -

Skylakes, high elevation wilderness, is composed of landforms derived from mountain glaciation. These landforms are a combination of glacial pluck/scour and fill deposits of soils. The pluck and scour landforms are convex rock knobs and headwalls with little soil in place (see the RRNF SRI landtypes 17,17A, 22 and Miscellaneous Unit 3). The glacialfluvial deposits are moderately deep to deep (about 2 to 6 feet) and well to moderately well drained (see RRNF SRI landtypes 16, 20, and 20A). Some deposits are meadows and occur around lakes and in swales. These soils are poorly drained(see RRNF SRI Miscellaneous Unit 6).

The high elevation creates a soil climate that is very slow for vegetative response. The soils differ in their ability to modify the climatic effects due to there thermal properties, textures, colors and drainage characteristics.

The canyons were modified by glacial ice with soil deposits plastered on the sides. Subsequently these have been modified by erosional action which have left the soil deposits modified. The soils occuring on these slopes are generally shallow except for the toe slope positions. Bedrock outcrops occur as horizontal bands or sporatic outcrops. The soils on the upper slopes are typically shallow with a high coarse fragment content (see RRNF SRI landtypes 23, 36, and Miscellaneous Unit 3). The lower slopes have some of these same landtypes however are generally deeper colluvium (see RRNF SRI landtypes 39 and 19).

These slopes are steep and subject to rapid runoff from precipitation. Aspects play an important roll for vegetation response as can be seen. The south facing slopes are very slow for recovery of vegetation and go through a long succession of brush to trees. These dryer slopes often qualify for noncommercial forest land due to the soil-climate relationships.

The canyon bottoms are outwash deposits. The soils are deep to very deep and subject to erosional cutting and deposition (see RRNF SRI landtypes 18 and 19).

As mentioned these positions and soils are subject to erosional and depositional processes. The soils are very gravelly, cobbly or stony sandy loams. They are generally well to excessively drained.

On the mid elevation Forest Service lands the landforms are doninated by glacial moraines, including lateral moraines and ground moraines. The soils on these vary in depth and drainage depending on positions on the moraines (see RRNF SRI landtypes 10, 11, 12 and 13).

Dominant characteristics are: Very high content of coarse fragments within the soil, underlain by tillite-like material which is very slowly permeable, high rates of runoff laterally through the soil and often not well drained. Highly susceptible to site change from ground based equipment use. Moraine tops are generally shallow (less than 20 inches deep) which creates a marginal timber producing site at best.

The lower elevations, below the glacial moraines the landforms are derived from volcanic activity which consists of flats, footslopes and backslopes, some of which are covered by pumice (see RRNF SRI landtypes 14, 15, 26, 27,30, 31, 32, 33, 34 and 35). Also see the Jackson County soil survey for soils occurring on the BLM and private lands below the Forest Service Boundary.

These soils range in productive capabilities and need to be site specific evaluvated. There is a high degree of differences between the soils occurring in this area.

Current conditions of the soil resource

Soils in the Skylakes area have had little evaluation on conditions from management. The most heavily impacted soils are those around heavy use recreation sites. These sites are very slow and difficult to rehabilitate.

Soils on the mid elevations that have been deposited by glacial ice and have been subjected to management activities with ground based equipment are heavily impacted. This has come about by interruption of the lateral flow of ground water which has created a wet site which has altered the vegetation.

Soils at the lower elevations are mixed as to current conditon.

Appendix will list the RRNF SRI and the Jackson Co Soil Survey report.
Detailed current conditions are available.
Detailed soil prescriptions are available as to site characteristics vs management.

# APPENDIX F
# GEOLOGY REPORT
# FORKS WATERSHED

# GEOLOGY REPORT
# FORKS WATERSHED

## Regional Geologic Setting

The Forks watershed is underlain by the relatively youthful geologic formations of the High Cascades physiographic province. Refer to Figure 1 which shows the watershed is situated at the uppermost western flanks of the High Cascade Range. The formations vary in age from 6,800 to over 8 million years old. This range is a northerly trending, continuous belt of volcanic mountains stretching from northern California into southern British Columbia.

Figure 2 shows the relation of the watershed to its adjacent geologic provinces. To the west lies the Western Cascades physiographic province composed of volcanic deposits which are about 10 to 20 million years older than the High Cascades rocks. East of the High Cascade Range is the Basin and Range province. This is the familiar fault block mountain and valley system seen throughout the Klamath Basin region. The easterlymost of these major faults begins at the headwaters of the Middle Fork and trends due south along the crest of the watershed divide. It is along this fault system that the most recent volcanic peaks have grown. Figure 3, even though it depicts a region in the latitude of Eugene, shows how the fault systems and volcanic activites are connected in the Forks Watershed. The diagram also shows how volcanoes are generated by subduction of the east Pacific oceanic plate underneath the North American continental plate.

## Watershed Geologic Setting

The watershed analysis area contains numerous volcanic vents and associated valley filling lava flows. A few of the more familiar volcanic vents in the area includes: Blue Rock, Rustler Peak, Lodgepole Peak, Bessie Rock, Cinnamon Peak, Red Blanket Mountain, Devil's Peak and Union Peak.

Superimposed upon the volcanic landscape are the effects of extensive glaciation extending from the backbone of the High Cascade peaks down through the canyons of South and Middle Forks of the Rogue River and Red Blanket Canyon. As recently as 15,000 years ago a nearly continuous ice field covered the High Cascades from Mt. McLoughlin to Mt. Hood.

Glaciation caused thorough erosion and transformation of the terrain. Deep U-shaped canyons were carved into the major drainages and adjacent tributaries. At the highest elevations glacial cirques and lakes dominate the landscape where large symmetrical volcanoes previously stood. For example, Ruth, Ethel, and Maude Mountains, found along the northeast crest of the watershed, are the remains of the volcanic cores of these mountains. The previously existing lava flows which flanked the volcanoes have been stripped away by glaciers. Lower slopes and valleys are blanketed with thick deposits of glacial till scoured from the uplands.

The high rates of precipitation and abundant snowfall in the region gives rise to abundant creeks and streams. Much of the precipitation slowly percolates through the highly fractured volcanic deposits. Countless springs emerge on the mountain slopes yielding high quality ground water which feed the stream and river systems.

## Geologic Materials

Refer to Figure 4 which shows the types and distribution of rock formations and surficial deposits (glacial, alluvial). It reveals that much of the watershed has been blanketed by deposits left by recent and older glaciers. There are two age groups of volcanic formations in the study area. The older deposits are 2 to 8 million years old, while the younger rocks range from 1 million to 6,800 years old.

The vast majority of volcanic vents in the watershed have formed tall, steep-sided peaks known as composite volcanoes. The younger lava flows of intermediate composition (andesites and basaltic andesites) dominate the watershed. These innumerable lava flows are interbedded with volcanic ash, cinders and breccia.

More fluid lava flows of basalt are exposed in the watershed. Much of the basalt flows are older formations, many of which have been buried by the more recent andesitic flows and volcanic peaks. Basalts are found exposed in the valley regions such as along Red Blanket Creek and South Fork as well as forming gently sloping elevated terraces like those found between Red Blanket and Middle Fork, two miles west of Bessie Rock. Basalt formations are well exposed in the deep canyons carved at the confluence of the tributaries and the main stem of the Rogue River.

The culminating eruption of Mt. Mazama approximately 6,800 years ago left deposits of partially welded ashflow and airfall pumice in northern portion of the watershed. The main body of the ashflow traveled down the west flanks of Mt. Mazama and along the main stem of the upper Rogue River. The bottom of Red Blanket Canyon has substantial amounts of the deposits. Remnants of the ashflow are also found in both South and Middle Forks of the Rogue. Some of these deposits may have formed from the ashflow surging upstream along the bottom of these drainages.

## Erosion

Erosion is the dislodging, transportation and deposition of surficial soil and rock from the landscape in response to water, wind or ice. These agents of erosion are directly related to the climate of the region, both past and present. And, the climate itself is influenced by the landscape.

The formation of the High Cascade Range created a formidable barrier to easterly trending weather fronts. This caused climatic changes to the region in the form of increased precipitation as both rain and snow on the western slopes of the mountain range. As recently as 10,000 years ago, the high amounts of snowfall led to the glacial ice which so thoroughly scoured and eroded the terrain.

Retreat of the glaciers left oversteepened canyons walls as seen in Red Blanket Canyon and both forks of the Rogue. The steep walls are subject to accelerated rates of erosion, particularly once a drainage channel becomes entrenched. These sites can become the origin of snow avalanche chutes or debris slides.

Along the canyon bottoms, the erosive forces of the rivers have easily cut through the ashflow deposits.

The widespread glacial deposits in the watershed are not prone to excessive erosion due to their relatively gentle slopes and high rock content. At upper elevations glaciers did a thorough job of removing topsoil and leaving barren rock. Soil erosion from this region is minor.

### Mass Wasting

Mass wasting is the wearing away of the landscape brought about by downslope movement of soil and rock due to gravitational forces. The steeper the slope, the more likely to be influenced by mass wasting processes. Within the analysis area the most commonly recognized forms of mass wasting are debris slides which are confined to the steep glacially carved canyon walls. Rock fall is common wherever rock outcrops are exposed on slopes, particularly in the glaciated alpine regions.

An air photo survey at a scale of 1:24,000 confirms the majority of slope instability is limited to the oversteepened glacially carved canyon walls of Red Blanket and Middle Fork of the Rogue. There are numerous inactive debris slide/snow avalanche chutes along the canyon walls.

### Mineral and Energy Resources

There are abundant reserves of sand and gravel resources within the study area. In addition, large amounts of fresh lava flows suitable for crushed rock and riprap production are found throughout the watershed. A number of pits and quarries are established within the watershed which can adequately serve the needs of foreseeable future projects.

There are no know resources of metallic minerals, geothermal energy or petroleum deposits in the watershed. Inventories and studies indicate there is little potential for the discovery of such resources in the area.

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| Materials | Symbols | Color Shades |
|---|---|---|
| Alluvial | Qal | Yellow |
| Glacial | Qyg<br>Qog<br>Qg | Blue |
| Pyroclastic | Qpm<br>Qp<br>QTp<br>TI4 | Pink |
| Andesite | Qa<br>Qad (2 on Map?)<br>QTa<br>Ta | Brown |
| Basalts/<br>Basaltic Andesite | Qb<br>QTba<br>Tb<br>Tba | Green |
| Sedimentary | Td | purple |
| Intrusive | Qii<br>QTbi<br>QTmi<br>Tii | Red |

## Literature Cited

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Blair, W.N., Wong, A., Moring, B.C., Barnard, J.B., Page, N.J., Gray, F., 1981. Reconnaissance Geologic Map of Parts of the Gold Hill, Medford, and Talent 15' Quadrangles, Southwest Oregon, United States Geological Survey, Open-File Report 81-1076.

Orr, E.L., Orr, W.N., Baldwin, E.M., 1992. Geology of Oregon, 4th Edition. Kendal/Hunt Publishing, Dubuque, Iowa, 254p.

## SUMMARY OF FINDINGS

The Analysis Area consists of numerous, young volcanic peaks and associated lava flows which form the backbone of the High Cascades Range. Extensive alpine glaciation caused dramatic sculpting and erosion of the terrain. Scraggy peaks, cirque basins and lakes in the uplands give way to long, sweeping, glacially carved U-shaped canyons in the mid-elevation range. The mountain slopes and valley bottoms are blanketed by glacial deposits. Most recently, pumice-rich ashflow deposits traveled down Red Blanket, South and Middle Forks of the Rogue River.

Soil erosion rates are relatively low due to abundant exposed rock in the uplands, and gently sloping terrain and high rock content of the glacial deposits covering the mid and low slope positions. The exception to this are the glacially oversteepened canyon walls where numerous debris slides have incised into the slopes and soil ravel rates are higher.

Roading and timber management have had a minimal effect on rates of slope instability and these activities do not occur along the oversteepened canyon walls. There are sufficient reserves of sand, gravel and rock supplies to provide for future needs in the Analysis area. There is very low probability of discovering metallic mineral deposits, geothermal or petroleum resources in the area. In the uplands, spectacular scenery produced by the geologic and glacial history provides rugged terrain and prime recreation and wilderness opportunities.

## DESIRED FUTURE CONDITION

Watershed Improvement Inventory has been completed. Any localized sites of man-caused accelerated erosion or mass wasting have been identified and corrected. Roads, particularly those located in the Riparian Reserves, not needed for future management and access are stabilized and decommissioned. Rock pits that are depleted have been successfully reclaimed. To protect high quality water resources, vegetation throughout the watershed has been managed such that vigorous, healthy stands are maintained. Recreation and wilderness users have access to geologic interpretive sites to better understand and appreciate the unique watershed history and setting.

## RECOMMENDATIONS

1. Complete Watershed Improvement Needs inventory to identify and prioritize restoration projects.

2. Complete Access and Travel Management plans to identify candidate roads for decommissioning.

3. Inventory non-system roads (skid trails, private roads, landings) to attain a complete picture of roading impacts to watershed health.

4. Stabilize sites impacted by accelerated rates of erosion and slope movement.

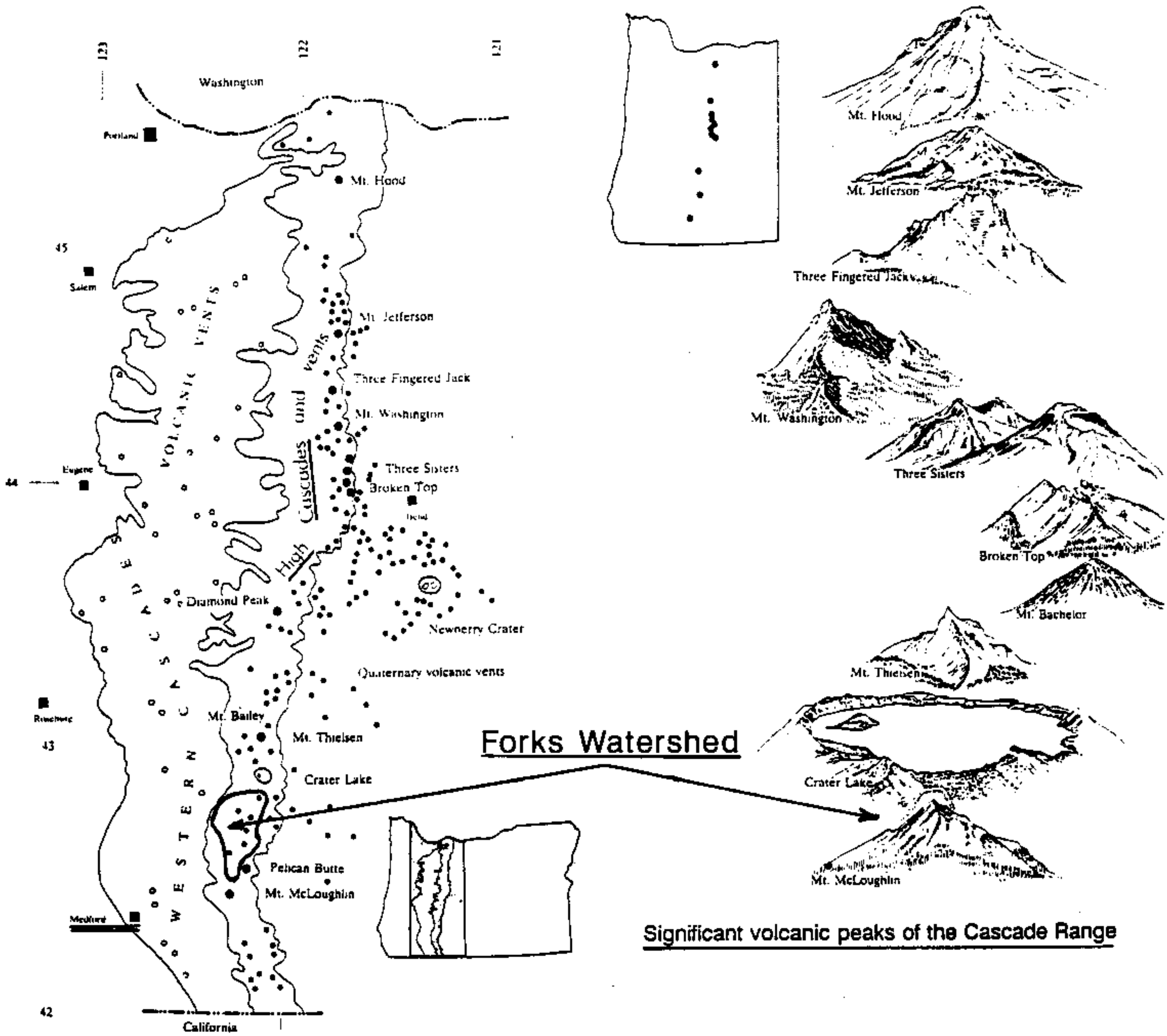
5. Restoration activities within the Interim Riparian Reserves boundaries should be analyzed by an interdisciplinary team. Depending upon the complexity of the project, the team should involve: a hydrologist, fisheries biologist, wildlife biologist, silviculturalist, project engineer, soil scientist and engineering geologist.

6. Update long-term rock resource management plans to assure that adequate rock materials are economically available for anticipated future needs. Where appropriate, rehabilitate abandoned/depleted rock sources.

7. Ground disturbing activities within unstable, potentially unstable, compactable, or highly erodible soils should be planned with on-the-ground assistance of a qualified soil scientist and/or engineering geologist.

8. Emphasis for vegetation management activities in unstable or potentially unstable terrain should be on maintenance of a healthy, vigorous stand with the intention of enhancing slope stability and minimizing soil erosion and/or compaction.

9. Provide for geologic interpretation of the watershed for the public and employees. These may include brochures with maps and descriptive text and interpretive sites at key viewpoints or places of interest.

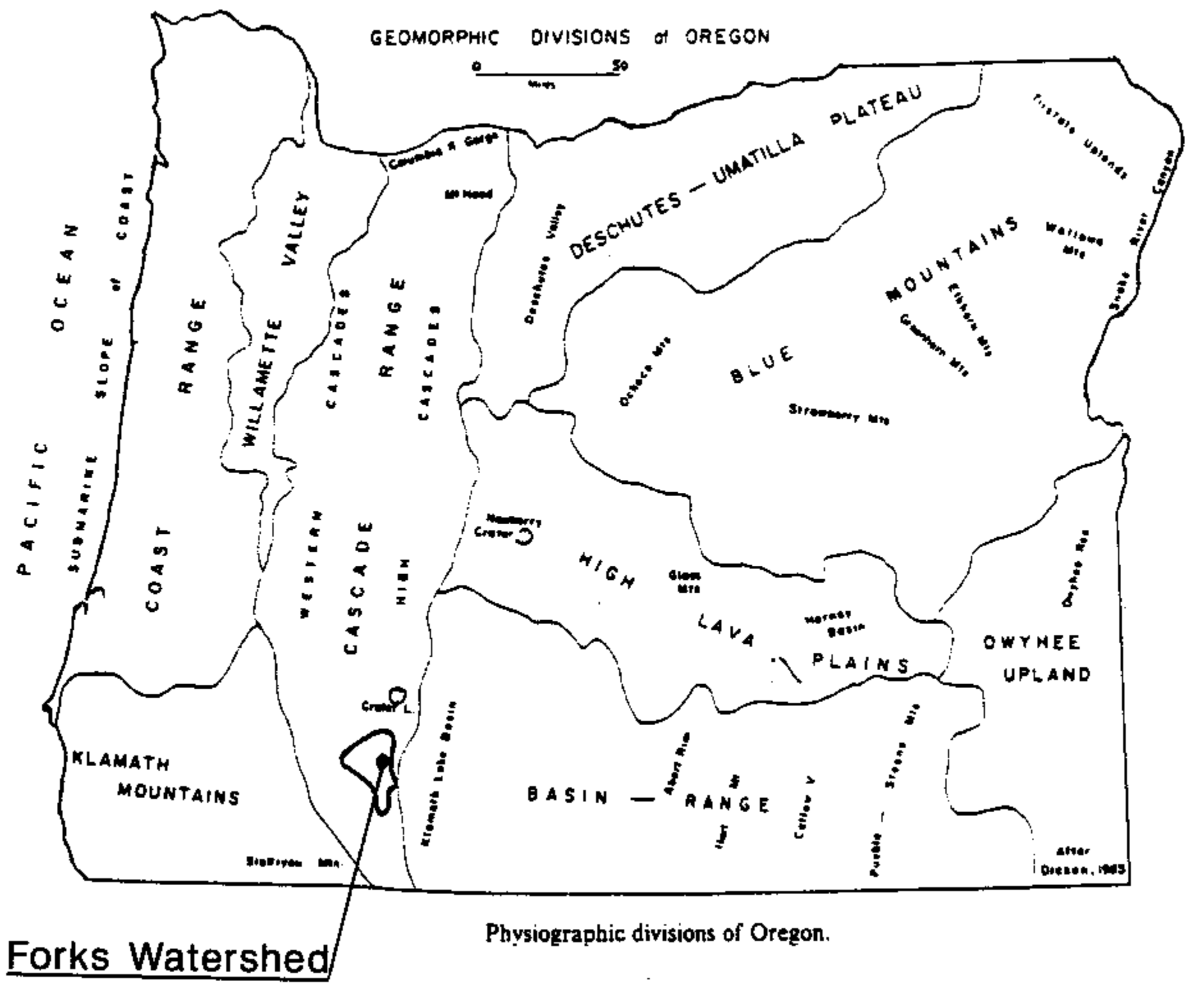



Significant volcanic peaks of the Cascade Range

Volcanic vents in the Western and High Cascades
(after Peck, et al.,1964; Priest, et al., 1983)

From: GEOLOGY OF OREGON 4th ed.

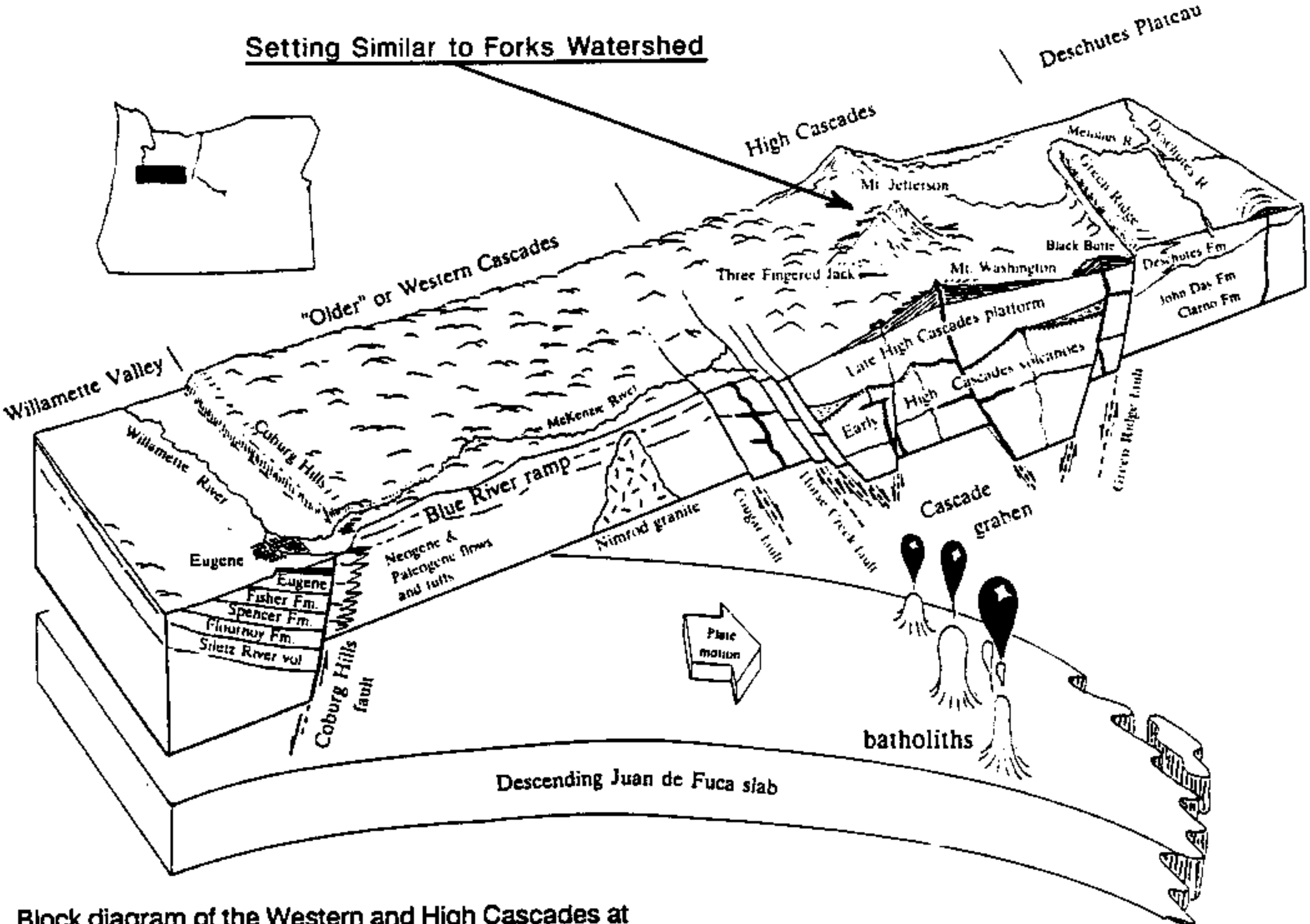
**Figure 1**




Physiographic divisions of Oregon.

From: GEOLOGY OF OREGON 3rd ed.

**Figure 2**



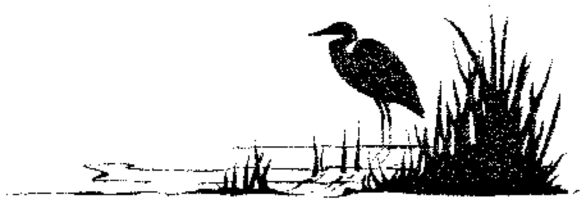

Block diagram of the Western and High Cascades at the latitude of Eugene (after Volkes, Snavely, and Myers, 1951; Gandera, 1977; Taylor, 1990)

From: GEOLOGY OF OREGON 4th ed.

**Figure 3**

# APPENDIX G
# FORKS WATERSHED
# TERRESTRIAL WILDLIFE ASSESSMENT

# FORKS WATERSHED ANALYSIS
# TERRESRIAL WILDLIFE
# ASSESSMENT



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**Date: May 30, 1997**

The objective in the Forks Watershed Analysis (South and Middle Forks of the Rogue River) is to maintain and enhance late-successional forest habitat within the Middle Fork Late Successional Reserve (LSR) #RO 226, and to maintain Sky Lake Wilderness (est. 1984) and Crater Lake National Park (est. 1902) values.

The Terrestrial Wildlife Report is divided into three components. The first component describes the history of wildlife habitat; the second, the species located within the watershed; and the final component discusses trends occurring in the watershed.

**Vegetation Analysis of Wildlife Habitat within the Forks Watershed**

The basis for establishing or comparing historic wildlife habitat conditions within the Forks Watershed is the Jackson and Klamath County stand type maps of 1947 & 1949, and the 1989 Condition Class layer [available at the District within the Geographic Information System (GIS)]. The assumption is that data from the 1947 and 1949 vegetation mapping provide an accurate account of the forest during this era. This assumption is the backbone for comparing the condition class information from 1989 with the 1947/49 forest types. Current vegetation conditions were examined using the 1989 (updated to 1997) Condition Class GIS layer from the Butte Falls and Prospect Ranger Districts. Condition Class is an interpretated layer from the old TRI system. Though not a true vegetation data set, it does allow for some comparison with the County 1947/49 vegetation mapping.

***Historic Wildlife Habitat (1947 & 1949)***
The habitat assessment using the county data set is missing information on approximately 17,193 acres of land which appears to be the private land west side of the Forest boundary and a small area in the northeast corner located within Crater Lake National Park. An additional 2,214 acres is classified in stand components not found on the species code listing. The information discussed in this section represents the remaining 112,892 acres. The County data set is an interpreted fixed classification layer and therefore intuitive or rigorous analysis can not be accomplished. The Forks Watershed Assessment will examine wildlife habitat in the broader context.

Four habitat types from the 1947/49 county mapping were chosen to portray vegetation conditions prevalent in the watershed. The categories are, Old-Growth/Late-Successional, Mid-Seral/Mid-Successional, Transition Early-Seral/ Early-Successional and Early-Seral/Early-Successional. Approximately 83,802 acres (74%) of the forested stands exhibit conditions which can be classified as Old-growth/Late-Successional stands. This category also represents the tree species composition found in the Forks watershed (Table A.). The Mid-Seral/Successional category covers 9,548 acres, the Transition Early-Seral/Successional another 8.5 acres, and finally Early-Seral/Successional stand conditions (Table A.) on 19,533 acres of the landscape.

The 1947/49 County forest stand mapping depicts a watershed with a large percentage (75%) in late-succcesional habitat, generally, dominanted by two forest types; Douglas-fir at 27,300 acres (33%), and True Fir at 34,539 acres (41%). Another category, early-seral/successional, indicates a low to moderate presence[19,533 acres ( 17%)] in the watershed. Forest plantations represent 18% (3,539 acs.) of the early-seral conditions found in the watershed, while fire has affected 8,454 acs (43%) of the forest stands.

Northern Spotted Owl Habitat: Suitable spotted owl habtiat (65%-73,383 acres, Table D.) and dispersal habitat (2% - 1,969 acs., Table D.) make up 67% of the forested stands within the watershed. If all the available suitable habitat was occupied than approximately 9 pairs of spotted owls could inhabit the 73,383 acres (assumes about 8,000 acres of suitable habitat per owl pair). This also assumes all available suitable owl habitat acres are occupied. Owl habitat can also be examined using habitat viability criteria for the Southern Oregon Cascade Province (SOCP). If we use 1,842 acres of suitable owl habitat per owl pair (minimum viability standard for the 1.2 mile radius SOCP owl home range), then 40 owl pairs could be present. Obiviously, based on our current population assessment in this watershed, we are well below the potential. This indicates that many factors, other than just spotted owl habitat, contribute to spotted owls occupying and using suitable habitat.

Great Gray Owl Habitat: Approximately 81,276 acres of nesting habitat, 7,540 acres of optimal foraging habitat, and 11,993 acres of foraging habitat was available prior to 1947. This habitat assessment is based on the stand variables were are currently using to define great gray owl habitat.

Red Tree Vole Habitat: Approximately 27,720 acres (25%) of the forest stands during 1947/49 era supplied potential suitable red tree vole habitat (Table Fa). Prior to the 1910 fire there was approximately 39,713 acres of petential red tree vole habitat (RTV), but the 1910 South Fork fire and logging reduced about 11,993 acres of low elevation Douglas-fir forests, reducing the amount of RTV habitat within the watershed.

Special Habitats: Rock outcrops, vernal seeps/springs, wet marshy areas are prevalent in the watershed. Little information exists to collaborate the condition of these resources in the watershed.

Forest Fragmentation: Prior to and leading up to the 1947/49 era, forest fragmentation was not viewed as harmful to species within the Forks Watershed. Natural barriers (rock, streams, climatic factors), few roads, creeks and rivers, elevation , and thermal changes created by stand replacement fires (South Fork, 1910 - 10,342 acres) made up most of the fragmentation conditions in the watershed. Less mobile species, like the salamander group, are most likely effected by increased roading and thermal changes (canopy cover manipulation) which have occurred since that time.

Other species, like quail, blacktail deer and roosevelt elk have responded quite well to the increase in edge habitat created by our harvest and roading practices. The direct population response to habitat fragmentation is portrayed in the change of the roosevelt elk population from 16 animals in 1926, to over 3,000 in the early 1990's.

***Current Wildlife Habitat (1997)***

The habitat assessment using the 1989 data set is missing information on approximately 6,025 acres of land which appears to cover private land located on the west side of the Forest boundary, and a small area in the northeast corner, located within Crater Lake National Park. The information discussed here represents the remaining 130,161 acres of forest conditions. The 1989 data set is an interpreted fixed classification from the old TRI timber layer and therefore rigorous analysis is not possible, so this assessment will look at habitat in a much broader perspective.

Four habitat types represent the 1989 (updated to 1997) data set to portray vegetation conditions prevalent in the watershed in 1997. The categories are, Old-Growth/Late-Successional, Mid-Seral/Mid-Successional, Transition Early-Seral/ Early-Successional and Early-Seral/Early-Successional. Approximately 33,337 acres (26%) of the forested area exhibit stand conditions which can be classified as Old-growth/Late-Successional stands. This category represents the Douglas-fir and Shasta red fir communities (Table B.). The Mid-Seral/Successional category covers 68,083 acres, the Transition Early-Seral/Successional 9,802 acres, and the final category is represented by 11,946 acres of Early-Seral/Successional stand conditions (Table B.).

The 1989 (updated to 1997) forest stand typing portrays a watershed where only a one-quarter of the 1947/49 stand conditions are dominated by late-successional habitat. Early-seral/successional habitat indicates a low to moderate coverage (19,533 acres/ 17%) in the watershed. Forest plantations repsresent 9% (11,946 acs.) of the early seral conditions found, and no fire information exists in the 1989 data set. Aggressive fire suppression campaigns (1910), refined technology, and increased access has improved the Forest Services ability to effectively suppress fires in the watershed.

Habitat assessments on three species from the Northwest Forest Plan (1994) will be discussed in more detail. The species are; the northern spotted owl (*Strix occidentalis caurina*); the great gray owl (*Strix nebulosa*); and the red tree vole (*Arborimus longicaudus*). All three of these species depend on late-successional habitat or late-successional stand conditions to remain viable in the ecosystem. One species, the northern spotted owl has good dispersal capability if certain stand conditions are available throughout the landscape. These conditions are; at least 40% canopy cover and an average tree size of 11 inch d.b.h. Subsequently, the under story must be open enough for an owl to disperse through. The great gray owl has the ability to disperse over a fairly large area, but usually stays in close proximity to a female and nest site. No information exists concerning juvenile great gray owl dispersal in southwest Oregon. The red tree vole is generally considered to have poor dispersal capabilities. Recent work done by Pacific Northwest Experiment Station (PNW) researcher Brian Bisswell (PNW) might shed some light on the dispersal capabilities of red tree voles in southwestern Oregon. Fragmentation might be one factor that influence this species ability to disperse throughout the watershed.

Northern Spotted Owl Habitat: Since 66% of the Forks Watershed is located within an LSR (USDA 1994), suitable spotted owl habitat is a concern within the watershed. Is there adequate acres of habitat available to support the owls pairs residing in this portion of the Middle Fork LSR? The Middle Fork LSR is 49,805 acres of which 56% is in Late-Successional stand conditions. The Forks Watershed represents 66% of the acres available within the Middle Fork LSR and has 15,226 acres (55%) of late-successional stand conditions.

Northern Spotted Owl Critical Habitat: Critical Habitat Unit OR-35 generally follows the same boundary as the Middle Fork LSR, but has some minor boundary variations along the northwest and western boundary. In some instances the LSR boundary encompasses more landscape than the CHU boundary. This mainly occurs along the western boundary. In other instances the CHU bounday covers more area than the LSR boundary. CHU OR-35 is approximately 68,895 acres in size, of which 68% (46,521 acs) is in the Forks Watershed. The CHU habitat within the Forks Watershed is made up of 14,990 acres of suitable spotted owl habitat (nesting, roosting, foraging), 8,452 acres of dispersal habitat, 22,043 acres of capable habitat (stands capable of but currently not providing dispersal or suitable habitat), and 1,036 acres of non-habitat (lands not capable of becomming dispersal or suitable spotted owl habitat).

Late-Successional Reserve Habitat: The Middle Fork LSR generally follows the same boundary as CHU OR-35, but varies along northwest and western boundary of the Forks Watershed. In some cases the LSR bounday covers more landscape than the CHU boundary, mainly along the western edge. The Middle Fork LSR is approximately 49,805 acres in size, which represents 92% (45,668 acs) of the Forks Watershed. The LSR habitat within the Forks Watershed is made up of 15,226 acres of suitable spotted owl habitat (nesting, roosting, foraging), 8,086 acres of dispersal habitat, 21,189 acres of capable habitat (stands capable of but currently not providing dispersal or suitable habitat), and 1,167 acres of non-habitat (lands not capable of becomming dispersal or suitable spotted owl habitat).

Great Gray Owl Habitat: 75,571 acres of nesting habitat is available within the Forks Watershed. These are not ground verified acres but a simulation of vegetation types that have been reported to be used by great gray owls. Foraging habitats are separated into three categories; optimal foraging, foraging, and marginal foraging habitat conditions (Table E). Optimal foraging comprises 1,876 acres, foraging 12,799 acres and marginal foraging 8,145 acres within the watershed.

Red Tree Vole Habitat: 64,126 acres (47%) of suitable red tree vole habitat exists within the Forks Watershed (Table Fa). The Forks Watershed falls within the South Fork Rogue River (#02) 5th field watershed. A vegetation analysis was conducted using parameters outlined in the November 4, 1996 draft Red Tree Vole Protocol. The fifth field watershed (#02) covers 114,326 acres, of which, 112,247 acres is in federal ownership (Forest Service). The habitat assessment indicates 19,784 acres of potential red tree vole habitat is available which complys with all the criteria for assessing the need for site specific surveys on ground disturbing projects in the watershed. The #02 5th field watershed (of which Forks is a part of) has; (1) more than 10% federal ownership; (2) has more than 40% potential red tree vole habitat which should remain to the year 2000. No habitat surveys are required prior to ground disturbing projects, unless more than 3000 acres of potential red tree vole habitat is expected to be impacted before the year 2000.

Special Habitats: Special habitats includes all those species closely associated with rock outcrops, or talus (peregrine falcon, yellow-bellied marmot, California wolverine, pika), or species associated with wet marshy areas (e.g. sandhill cranes), and species which rely on standing dead and down wood (e.g. fisher, pine marten, woodpecker community).

Several potential cliff sites exist within the Forks Watershed that might be occupied by peregrine falcons. Three of the potential cliff sites are located within the Sky Lakes Wilderness and Crater Lake National Park. The remaining potential site is on national forest land.

Rock talus habitat can be readily found within the Sky Lakes Wilderness and Crater Lake National Park. No recent marmot sightings have occurred, however pika (rock rabbit) have been observed at three locations within the Sky Lakes Wilderness and on numerous sites throughout national forest lands.

Several marshy wet spots can be found within the watershed. One area has sandhill crane activity within it, but is not included in this assessment. This site should be covered under the Bureau of Land Managements Lost Creek Watershed Assessment.

Many species are closely associated with or have a portion of there life history tied to standing dead and down habitat. Very little data exists within the agency which could adequately quantify this habitat. The draft South Cascades Late Successional Reserve Assessment (1997) using southwest Oregon ecoplot information indicates the Middle Fork LSR (#RO 226) is in the Western Hemlock and White fir series. Small portions of the watershed, mainly at the higher elevations along the wilderness and park boundaries, are in the Shasta red fir and mountain hemlock series. Table I and Table J describe standing dead and down habitat components within the LSR. These tables become the new standard for maintaining or enhancing this habitat component in the watershed. Generally, the pieces per acre of logs range from 12 pieces/acre (Mtn. Hemlock) to 42 pieces/acre (W. Hemlock) and the standing snags range from 0 snags/acre (all plant series) to 22 snags/acre (Shasta-red fir) in the 16" D.B.H. plus classification.

Evaluating this habitat at the watershed scale, most forest activites occurring in the Forks watershed have an impact on this important habitat component. Some activities (personal use firewood cutting) are benign in that very little habitat is affected at any one point in time, but cummaltively they can have a tremendous impact. Other activities, such as timber harvest, roadside hazard tree removal, commerical firewood cutting and slash abatement projects have a more immediate impact to this important resource.

Early Seral Habitat: Approximately 11,946 acres of early seral forest stand conditions exist within the watershed. The early seral stands represent 10% of the vegetation component within the watershed. A majority of these early seral stands were developed with the goal of increasing the amount of forage available for big game (blacktail deer and Roosevelt elk). The pattern imprinted on the landscape is an alternate leave block design, which correlates with the type of fragmentation we see occurring on the landscape.

**Wildlife Species within the Forks Watershed**

***Historical Perspective***

Historical based scientific collecting parties (Gabrielson, et. al. 1970), trapper reports, forest visitors, hunters, and Forest Service personnel indicate many of the upper trophic level species (wolf, grizzly bear etc) are prevalent at some level within or near the watershed. Young and Goldman (1944) indicate that approximately 5 gray wolves (1939) existed within the Rogue River National Forest. Jewett (Young 1944) indicates the wolf is holding its own in the Cascade range of Oregon, but fellow biologist Robert Rowe indicates a downward trend with this species in his assessment. It is felt by most that by the 1940s the gray wolf was either extinct of becoming extremely rare within the state. Game and varmint species are of great interest to many of the forest visitors and recreationist. Rocky mountain elk were brought in from Wyoming in the early 1900's to promote a huntable population within the Cascade Forest Reserve. In 1926, the Oregon Department of Fish and Wildlife reported 16 elk , 3,645 blacktail deer, 320 black bear (Brown, 1960) within the Cascade Forest Reserve. Because the data was either not collected in the same fashion from year to year or was reported in different formats, so data analysis between years is very difficult and perhaps meaningless. However, anecdotal information does provide insight into why certain species might increase or decrease based on changing forest stand conditions.

*Current Status*
Today the wolf and grizzly bear are no longer part of the ecosystem in southwest Oregon, varmints are still pursued but not with the same intensity or objective, and game species, especially blacktail deer and elk are increasing in sport hunting popularity. The Oregon Department of Fish and Wildlife is trying to maintain bench mark populations for blacktail deer (24,500) and elk (3,000 to 3,500) across the Rogue hunting unit (includes the Cascade portion of the Rogue River National Forest)

There are 16 spotted owl pairs and 5 territorial single spotted owls located within the watershed. 8 spotted owl pairs have more than 40% suitable owl habitat within their home range (1.2 mile radius). The remaining 8 owl pairs and 5 territorial singles have less than 40%, in fact, 52% of the owl pairs and territorial singles have less than 30% available habitat within there home range. The viability of these sites, in the short term is in question. If these sites were in matrix managed lands they would be on the downward trend or "blinking out". Since they are in an LSR, the habitat is expected to increase and the viability of these sites should increase over time.

Forest Fragmentation: Prior to and leading up to the 1947/49 era, forest fragmentation was very suttle on its impact to species within the Forks Watershed. Natural barriers (rock, streams, climatic factors), few roads, creeks and rivers, elevation , and thermal changes created by stand replacement fires (South Fork, 1910 - 10,342 acres) were the barriers most often confronted by species. The less mobile species, like the salamander group, are impacted more with extensive road development and thermal changes on the forest floor from tree canopy manipualtion (timber harvest).

**Wildlife Habitat Trends within the Forks Watershed (1997)**

*Habitat Trends*
Forest stands continue to change over time. Public involvement in land management decisions, federal and state laws, agency policies and political direction from Congress drive the rate of change on our remaining forest stands. Since the 1947/49 assessment there has been a 43% decrease in the amount of old growth stands in the watershed. Conversely, there is a two fold increase in the amount of stands which make up the mid-successional component. This is a result of stands developing after the 1910 South Fork fire, and early harvest in the 50's. Early seral conditions have decreased since the late 1940's. I believe this fact represents the effect our fire suppression policy has had on stand development in the watershed.

Northern spotted owl habitat has decreased which has lead to the listing of the northern spotted owl and it's critical habitat. This event along with the recent listing of the marbled murrlett (*Brachyramphus marmoratus*) and coho salmon (*Oncorynchus kisutch*) has brought increased focus on late-successional habitat. Late-successional habitat and the processes and functions it provides are being examined in ways scientists never dreamed of. Biological fields such as Conservation Biology are at the fore-front in determining the types of changes we make on the remaining pieces of late-successional habitat throughout Pacific Northwest Forests.

Fire affects on stand development, as well as insect and disease, greatly influence the structure and composition of our forest stands. Fire exclusion has lead to an increase in shade tolerant species and contributed to the influence of insect/disease patterns we see today. There has been a considerable shift in the fuel composition across the forest floor. Today, more of the down wood component is in the smaller diameter material (Table I.). The draft South Cascades LSR Assessment (1997) eludes to the fact that our down wood component, during historical times, was in the larger diameter material. I think if we reflect on this event for a moment, we would conclude that our management practices have targeted the large diameter material by either removing or burning it.

Extensive grazing over the last 100 years has influenced and affected wet and dry meadow habitats distributed throughout the watershed. Species composition and abundance has changed with intensive grazing moving historical vegetation communities from a native composition to one which now clearly exhibits a mixture of recently introduced exotic plants.

Forest harvest, road and facility development greatly influence the amount and kind of fragmentation occurring on the landscape (Forks Watershed). Historically, forest fragmentation was due to large stand replacement fires or insect and disease outbreaks, and natural barriers (rock, streams, etc). Today, what we see is an alternate cut harvest pattern across the forest favoring early-successional species (deer and elk), 3.36 miles per sq/mi of road corridors effecting 9,050 acres of forested and non-forested land, increasing recreational development, and other minor societal improvements (e.g. power generation plants). All, greatly influence the juxtaposition of vegetation on the landscape and the effect it may have on certain groups of species.

*Species Trends*
Once prevalent large carnivore species (grizzly bear, wolf) are no longer part of the ecosystem. Peninsular populations, such as the California wolverine, and Pacific fisher are rare or non-existent within the watershed. Avian populations are continuing to decline, especially for those species dependant on low elevation late-successional habitat. Some species, such as the northern spotted owl are declining but expected to stabilize their population based on the agencies late-successional forest policy (NW Forest Plan, 1994).

Species once thought extirpated (peregrine falcon) from the landscape are slowly returning to reoccupy historic nest sites, as well as establish new nesting locations. However, population numbers, and especially reproductive success is far below the level set for determining a recovered population. Organo-chlorine and phosphates, as well as PCBs, are still influencing the success of this and other species which are sensitive to these types of chemicals.

More species are being pushed to the lower limits of there habitat threshold (e.g. habitat is becoming a limiting factor). The effects of packing and stresses associated with this phenomena are becoming more apparent across the landscape. The northern spotted owl is a good example of the packing affect.

Fragmentation is influencing the distribution and numbers of early-successional species found in the watershed. Deer and elk population numbers have risen since the early 1900's. Sport hunting and general recreation is increasing at an alarming rate affecting and stressing wildlife populations. Some of the research being conducted in the Pacific Northwest is aimed at addressing forest fragmentation and its affect on neo-tropical migrant birds. Some of the preliminary findings indicate that early successional species, especially edge dependant species, are increasing. Road densities on the landscape were increasing at alarming rates. Due to declines in road maintenance funding and the implementation of the Northwest Forest (USDA 1994) and Rogue River Land Management Plans (USDA 1990), road development in general is starting to take a downward trend. Emphasis is now being placed on reducing road densities and restoring past problematic areas.

New survey and manage species (great gray owl, red tree vole) are being examined more intensively than ever before. Habitat components, such as standing dead snags and down large logs, are being emphasized in management prescriptions. Many studies, old and new, indicate that a large number of species are highly dependant on standing dead and down habitat for maintaining their viability within the landscape (watershed, forest and province). Vegetation influenced by 100 years of sheep and cattle grazing has influenced species composition within many of the meadows throughout the forest, and especially in the higher elevations meadows within the Sky Lakes Wilderness. Though sheep grazing is no longer practiced in the watershed, cattle grazing is still occuring at fairly high numbers. However, the current level of livestock grazed in the watershed is no where close to historic levels.

**Desired Future Conditions within the Forks Watershed**
Desired future conditions for "Late-Successional Reserves is to maintain a functional, interacting, late-successional and old-growth forest ecosystem" (USDA 1994, and draft USDA 1997). The draft LSR Assessment (USDA 1997) "assumes if the structural components of large trees, multiple-canopy stands, snags, down wood, logs in streams, and small openings are in place, than the ecological processes and functions associated with late-successional forest will continue".

Terrestrial and aquatic areas with about 75% late seral conditions are desired with the following components:

Vegetation structure and pattern are diverse; Habitat for early/mid successional species is maintained; Connectivity exists between and within watersheds; Snags and down wood levels maintain species diversity; and wet area habitats maintain high levels of source populations (draft South Cascades LSR Assessment 1997).

Indicators for Late Seral DFC is percent of capable, terrestrial and riparian LSR acres, in late seral condition on a 5th field watershed scale. Use the most recent satellite imagery available which provides an accurate overview of vegetation size and structure.

**Potential Projects within the Forks Watershed**

(1) Reduction in road density within and outside of the LSR. Conduct a Road need analysis for the Forks Watershed.

(2) Use the "new" BLM satelite imagery as the base vegetation layer. Will provide info on all the acres including private land and National Park land.

(3) Work with the State Fish and Wildlife to enhance big game habitat within the lower portion of the forks watershed.

(4) Update the BGH to reflect forage and hiding cover areas, link with water, wetlands. Develop a calving area map to be put into GIS.

**Data Gaps within the Forks Watershed**

* Run the Fragstat Model on the Forks watershed to establish baseline fragmentation conditions.
* Run the road information to be specific to winter range (MS 14) strategy. Determine open road densities.
* Update owl information to reflect NW Forest Plan demographic monitoring information (1997) to validate number of owl sites within and outside LSR.
* Develope a layer and data set to addressing special habitats and associated species.
* Validate and develop a calving area map for the watershed.
* Finish the big game assessment on the Prospect Ranger District of the Forks Watershed to match with the Butte Falls GIS layer.

**Data Sources and Literature Cited**

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**Table A. Historical Condition of Terrestrial Habitat in the Forks Wateshed**

| 1947/49 Map Code | Vegetation Type | Acres |
|---|---|---|
| | *Old-Growth/Late-Successional* | |
| 6 | Douglas-fir > 32"dbh | 27,300 |
| 20 | Ponderosa Pine > 22"dbh | 2,526 |
| 23 | True fir >16"dbh | 34,539 |
| 29 | White fir > 16"dbh | 11,544 |
| 25 | Lodgepole Pine > 12"dbh | 98 |
| 33 | Subalpine fir | 7,795 |
| | *Mid-Seral/Successional* | |
| 9a | Douglas-fir large poles 16-20"dbh | 302 |
| 21 | Ponderosa Pine < 20"dbh | 2,526 |
| 24 | True fir < 10"dbh | 34,539 |
| 30 | White fir < 14"dbh | 423 |
| 26 | Lodgepole Pine < 10"dbh | 3,014 |
| 27s | Mixed Forest > 12"dbh | 118 |
| 38 | Non-Commerical Forest Area | 149 |
| | *Transistion Early Seral/Successional* | |
| 9b | Douglas-fir pole 6-14"dbh | 80 |
| 26a | Lodgepole Pine < 6"dbh | 0.5 |
| | *Early Seral/Successional* | |
| 10 | Plantations | 3,539 |
| 37 | Deforested Burns | 8,454 |
| 2 | Grass, Sage | 7,540 |

**Table B. Current Condition of Terestrial Habitat in the Forks Wateshed (Condition Class)**

| Condition Class Code | Vegetation Type | Acres |
|---|---|---|
| | *Old-Growth/Late-Successional* | |
| OG | Old Growth | 2,373 |
| MH | Mature Habitat | 30,964 |
| | *Mid-Seral/Successional* | |
| MM | Mature Stand | 42,234 |
| MT | Mature Thinning Opportunity | 15,151 |
| MN | Mature, No-Thinnning Opportunity | 10,698 |
| | *Transistion Early Seral/Successional* | |
| PT | Poles, Thinning Opportunity | 941 |
| PN | Poles, No Thinning Opportunity | 3,877 |
| SH | Shelterwood | 4,984 |
| | *Early Seral/Successional* | |
| RO | Seedling, Satisfactory Stocking | 8,372 |
| RL | Seedling, Low Stocking | 274 |
| SO | Sapling, Satisfactory Stocking | 3,161 |
| SL | Sapling, Low Stocking | 139 |
| | *Non-Forest* | |
| NF | Non-Forest (Rock, Dry Grass e.t.c.) | 4,427 |
| RR | Range | 1,602 |
| WW | Water (may include riparian veg) | 682 |

**Table C. Comparison of Habitat Conditions in the Forks Watershed (1947/49 vrs Condition Class vrs PMR)**

| Map Comparision Code | 1947/49 County Vegetation Mapping (acres) | Condition Class Vegetation Mapping (acres) | PMR Vegetation Mapping (acres) |
|---|---|---|---|
| OG - Old Growth | 83,802 | 33,337 | 31 |
| Mid Seral | 41,071 | 68,083 | 47,620 |
| Transition Early Seral | 81 | 9,802 | 24,748 |
| Early Seral | 19,533 | 11,946 | 18,876 |
| Other | 0 | 6,711 | 0 |

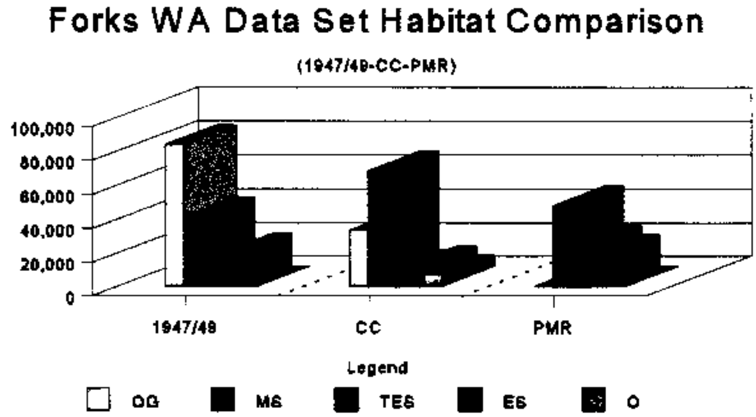


**Table D. Historic and Current Suitable Owl Habitat within the Forks Watershed**

| Habitat Classification | 1947/49 Habitat Conditions (acres) | Condition Class Habitat Condition (acres) |
|---|---|---|
| Suitable Spotted Owl Habitat (SOH) | 73,383 | 30,697 |
| Dispersal Spotted Owl Habitat (D) | 1,969 | 44,113 |
| Capable Spotted Owl Habitat (C) | 14,112 | 54,216 |
| Non-Owl Habitat (NF) | 23,499 | 1,130 |
| TOTAL | 112,963 | 130,156 |

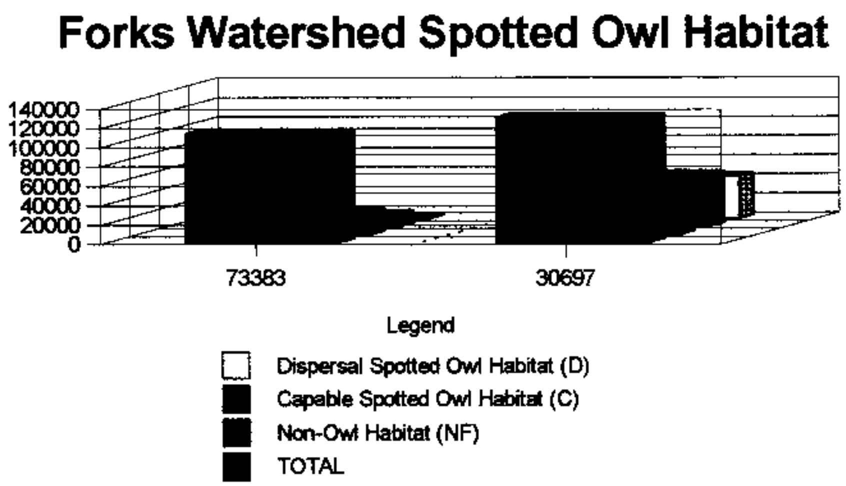


**Table E. Great Gray Owl Habitat within the Forks Watershed**

| Habitat Condition | Vegetation Analysis usingConditionClass | 1947/49 Habitat Condition (acres) | Condition Class Habitat Condition (acres) |
|---|---|---|---|
| Nesting | OG = Old Growth<br>MH = Mature Habitat<br>MM = Mature | 50,342<br>23,041<br>7,893 | 2,373<br>30,964<br>42,234 |
| Optimal Foraging | RL = Seedling low stocking<br>RR = Meadow | 0<br>7,540 | 274<br>1,602 |
| Foraging | RO = Seedlings, satisfactory (0-4.5" tall)<br>NS = Non-stock | 0<br>8,454 | 8,372<br>4,427 |
| Marginal Forage | SH = Shelterwood<br>SO = Saplings (avg. 4.5" tall & 4.9 dbh) | 0<br>0 | 4,984<br>3,161 |

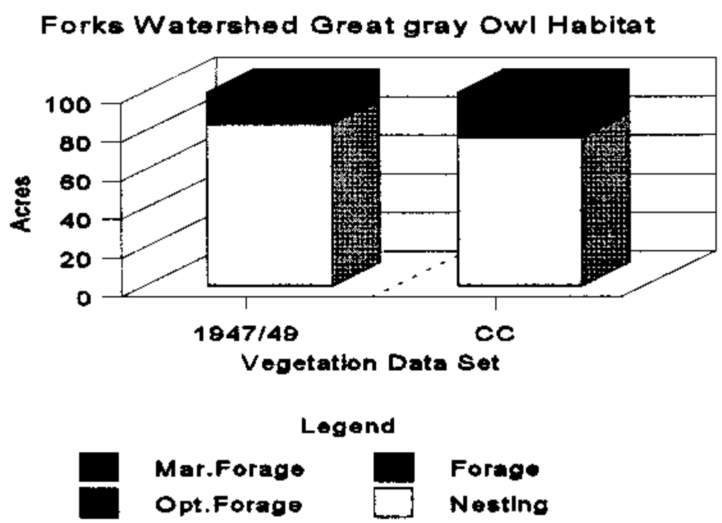


**Table F(a). Habitat Condition for Red Tree Vole within the Forks Watershed**

| Habitat Condition | Vegetation Analysis using ConditionClass | Acres |
|---|---|---|
| Suitable | OG = Old growth<br>MH = Mature Habitat<br>MM = Mature<br>MT = Mature Thinning | 2,311<br>30,439<br>20,938<br>10,383 |
| Total | | 64,126 |

**Table F(b). Red Tree Vole Habitat Availability**

| Forks 5th Field Watershed | | | | | |
|---|---|---|---|---|---|
| 5th Field Identifier | Total 5th Field Acres | Total 5th Field FS Acres | 5th Field FS Acres below 4300' | 5th Field Suitable RTV acres below 4300' | Habitat Threshold Condition (> or< 40%) |
| 02 | 114,326 | 112,247 | 34,430 | 19,784 | >40% (57%) |
| The threshold determining survey and management requirements for the red tree vole is: a minimum of 40% of the federal land in the fifth-field watershed is forested and (a) has approxiamtely 60 percent crown closure or greater, and (b) has an average conifer tree diameter at breast height (DBH) of approximately 10 inches or greater, and © this closure and diameter can be maintained through the end of the decade (year 2000) | | | | | |

**Table G. Forks Watershed Northern Spotted Owl Sites**

| OWL SITE NO. | OWL SITE NAME | OWL SITE STATUS | HOME RANGE > or < 40% |
|---|---|---|---|
| 6014 | Lick Creek | Pair | >40% |
| 6015 | Lower Red Blanket | Pair | <40% (>30%) |
| 6017 | Twenty-nine Creek | Pair | <40% (<30%) |
| 6050 | Bessie Rock | Pair | >40% |
| 6051 | Cinnamon Peak | Pair | <40% (<30%) |
| 6052 | Bessie Creek | T-Single | <40% (<30%) |
| 6053 | Otter Spring | Pair | <40% (<30%) |
| 6054 | Kerby Hill | Pair | <40% (<30%) |
| 6058 | Varmint Creek | Pair | >40% |
| 6086 | Homestead | Pair | <40% (<30%) |
| 3302 | Imnaha | Pair | >40% |
| 3303 | King Spruce | Pair | >40% |
| 3305 | Fantail | Pair | >40% |
| 3306 | Wickiup | Pair | >40% |
| 3312 | Imnaha Creek | T-Single | <40% (<30%) |
| 3323 | Whitman Creek | Pair | >40% |
| 3325 | Smith Rock | T-Single | <40% (<30%) |
| 3330 | Boundary | Pair | <40% (<30%) |
| 3334 | West Branch | T-Single | <40% (<30%) |
| 3343 | Mckie Flat | T-Single | <40% (<30%) |
| 3348 | Lava Ridge | Pair | <40% (>30%) |

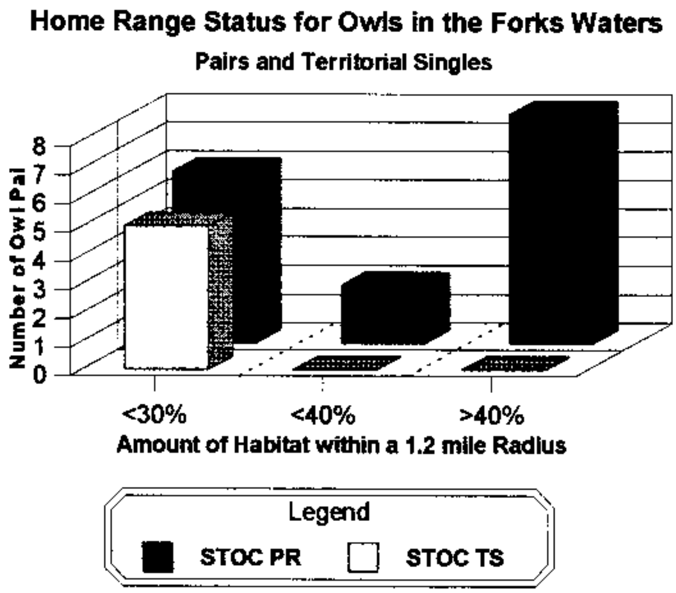

Home Range Status for Owls in the Forks Waters
Pairs and Territorial Singles
Number of Owl Pai
8
7
6
5
4
3
2
1
0
<30%
<40%
>40%
Amount of Habitat within a 1.2 mile Radius
Legend
STOC PR
STOC TS

**Table H. Forks Watershed Big Game Habitat**

| Habitat Code | Type of Habitat | Acres within Winter Range Stratey (Mgmt 14) | RRNF LMP Plan Standarsds (%) | Forks Watershed Current Condition (%) |
|---|---|---|---|---|
| F | Forage | 5,064 | 20 - 50 | 35 |
| CH | Cover, Hiding | not classified | NA | NA |
| CO | Cover, Optimal Thermal | 3,389 | 30 | 23 |
| CT | Cover, Thermal | 6,166 | 30 | 42 |
| Total | | 14,617 | 100 | 100 |

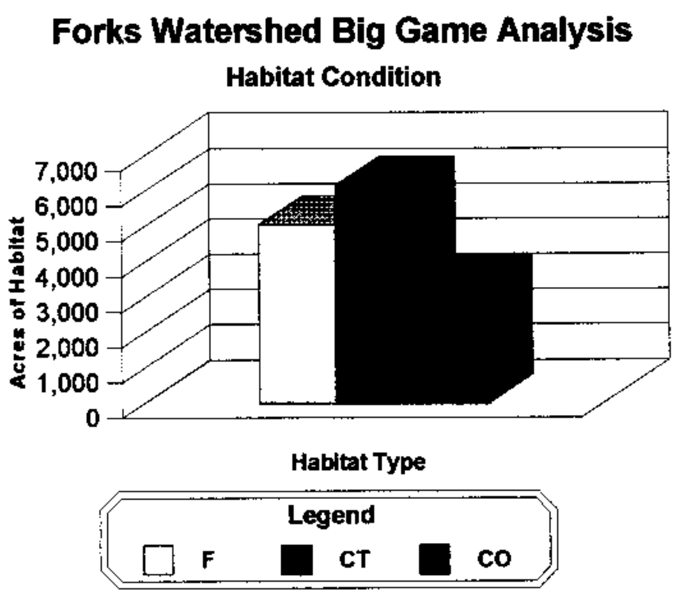


**Table I. Summary of Dead Woody Material Tons Per Acre, by Plant Series**

| | Pieces per acre by small end diameter and length | | | | | | Mean Length | Mean Decay |
|---|---|---|---|---|---|---|---|---|
| Small end diameter | 6-15.9" | 6-15.9" | 16-23.9" | 16-23.9" | 24"+ | 24"+ | (feet) | (Class) |
| Piece Length | <16' | 16+ | <16' | 16+ | <16' | 16'+ | | |
| White Fir, ABCO | | | | | | | 30 | 3.4 |
| median | 27 | 16 | 0 | 0 | 0 | 0 | | |
| mean | 56 | 20 | 8 | 2 | 3 | 2 | | |
| range | 0-462 | 0-81 | 0-109 | 0-19 | 0-82 | 0-18 | | |
| Douglas-fir, PSME | | | | | | | 20 | 3.4 |
| median | 95 | 0 | 0 | 0 | 0 | 0 | | |
| mean | 101 | 11 | 36 | 1 | 5 | 1 | | |
| range | 0-364 | 0-60 | 0-163 | 0-16 | 0-30 | 0-12 | | |
| Western Hemlock, TSHE | | | | | | | 30 | 3.6 |
| median | 33 | 16 | 0 | 8 | 0 | 0 | | |
| mean | 63 | 18 | 16 | 12 | 5 | 5 | | |
| range | 0-236 | 0-82 | 0-132 | -51 | 0-36 | 0-48 | | |

**Table J. Summary of Snag Information, by Plant Series**

| Plant Series | Snags per acre by DBH Class | | | | | Mean Diameter | Mean Height | # of Plots |
|---|---|---|---|---|---|---|---|---|
| | <9" | 9-15.9" | 16-19.9" | 20-23.9" | 24"+ | (Inches) | (Feet) | |
| Shasta Red Fir, ABAM | | | | | | 25 | NA | 10 |
| median | 0 | 0 | 0 | 0 | 0 | | | |
| mean | 12 | 6 | 2 | <1 | 4 | | | |
| range | 0-71 | 0-49 | 0-22 | 0-1 | 0-16 | | | |
| Mountain Hemlock, TSME | | | | | | 26 | NA | 18 |
| median | 0 | 0 | 0 | 0 | 4 | | | |
| mean | 4 | 6 | 2 | 1 | 3 | | | |
| range | 0-37 | 0-33 | 0-9 | 0-5 | 0-11 | | | |
| White Fir, ABCO | | | | | | 25 | 52 | 93 |
| median | 0 | 0 | 0 | 0 | 1 | | | |
| mean | 14 | 4 | 1 | <1 | 2 | | | |
| range | 0-203 | 0-67 | -12 | 0-5 | 0-21 | | | |
| Douglas-fir, PSME | | | | | | 29 | 26 | 13 |
| median | 0 | 0 | 0 | 0 | <1 | | | |
| mean | 5 | 2 | 1 | 1 | 1 | | | |
| range | 0-24 | 0-27 | 0-7 | 0-4 | 0-8 | | | |
| W.Hemlock, TSHE | | | | | | 30 | 34 | 22 |
| median | 0 | 0 | 0 | 0 | 3 | | | |
| mean | 5 | 5 | 2 | <1 | 3 | | | |
| range | 0-42 | 0-18 | 0-10 | 0-4 | 0-13 | | | |

**Table K. Forks Wateshed Special Species Occurrence (Codes listed at end of table)**

| U.S. FISH and WILDLIFE T&E SPECIES | | | | | |
|---|---|---|---|---|---|
| **SPECIES** | **STATUS** | **RANGE Y/N** | **P/A** | **HABITAT QUALITY** | **LEVEL OF SURVEY** |
| Peregrine falcon | FE, SE, 1 | Y | P | Medium | Limited |
| Northern spotted owl | FT, ST, 1 | Y | P | High | Thorough |
| Southern Oregon/Northern Calif coho salmon | FT, ST, 1 | N | A | Low | Thorough |
| **U.S. FISH and WILDLIFE SPECIES OF CONCERN (SoC)** | | | | | |
| Spotted frog | C, SC, BS, 1 | N | A | Low | Limited |
| Cascade frog | SoC, SV, 3 | Y | P | Medium | Limited |
| Foothill yellow legged frog | SoC, SV, 3 | N | A | Low | Limited |
| No. red legged frog | SoC, SV, 3, R | Y | U | Low | Limited |
| Tailed frog | SoC, SV, 3 | Y | U | Medium | Incidental |
| Northwestern pond turtle | SoC, SV, 2, R | Y | U | Low | Limited |
| Little willow flycatcher | SoC. 1 | Y | U | Medium | Limited |
| Northern goshawk | SoC. SC. 3 | Y | P | Medium | Limited |
| Tricolored blackbird | SoC. SP. 2 | N | A | Low | None |
| Western burrowing owl | SoC. SC. 3 | N | A | Low | None |
| Fringed myotis | SoC. SV. BS. SM. 3 | Y | P | High | Incidental |
| Long eared myotis | SoC. SU. SM. 3 | Y | U | High | Incidental |
| Long legged myotis | SoC. SU. SM. 3 | Y | U | Medium | Incidental |
| Townsend's big eared bat | SoC. SC. 2. R. | Y | N | Low | Incidental |
| Yuma myotis | SoC. SU. 3 | Y | S | Medium | Incidental |
| Pacific fisher | SoC. SC. 2 | Y | P | Medium | Thorough |
| California wolverine | SoC. ST. 2. R | Y | S | Medium | Limited |
| Klamath Mt. steelhead trout | PT. 1 | Y | N | Low | Thorough |
| Pacific lamprey | SoC. SV. 3 | Y | U | Low | None |
| Burnell's false water penny beetle | SoC. 4 | UNK | U | Low | None |

**Table K. Cont'd Forks Wateshed Special Species Occurrence (Codes listed at end of table)**

| U.S. FISH and WILDLIFE SPECIES OF CONCERN (SoC) - Cont'd | | | | | |
|---|---|---|---|---|---|
| **SPECIES** | **STATUS** | **RANGE Y/N** | **P/A** | **HABITAT QUALITY** | **LEVEL OF SURVEY** |
| Denning's Agapetus caddisfly | SoC. 3 | UNK | U | Medium | None |
| Green springs Mt. faurian caddisfly | SoC. 3 | UNK | U | Low | None |
| Schuh's homoplectran caddisfly | SoC. 3 | UNK | U | Medium | None |
| Siskiyou caddisfly | SoC. 3 | UNK | U | Low | None |
| Siskiyou chloealtis grtasshopper | SoC. 3 | UNK | U | Low | None |
| Mardon skipper butterfly | SoC. 3 | UNK | U | Medium | None |
| Franklin's bumblebee | SoC. 4 | N | U | Low | None |
| **OTHER (ODFW AND FS) SPECIAL STATUS SPECIES** | | | | | |
| Clouded salamander | SU. BS. 3 | Y | S | Medium | Incidental |
| Western toad | SV. 3 | Y | Y | Medium | None |
| California Mt. kingsnake | SP. AS. 3 | N | A | Low | None |
| Common kingsnake | SP. AS. 3 | Y | S | Low | None |
| Sharptail snake | SV. AS. 4 | N | U | Low | None |
| Black backed woodpecker | SC. AS. 3 | Y | S | Medium | None |
| Flammulated owl | SC. AS. 4 | Y | S | Low | None |
| Grasshopper sparrow | SV. 3 | N | A | Low | None |
| Great gray owl | SV. AS. SM. 4 | Y | P | Medium | Limited |
| Greater snadhill crane | SV. 4. R | Y | P | Medium | Incidental |
| Lewis woodpecker | SC. AS. 3 | UNK | U | Low | None |
| Northern pygmy owl | SU. 4 | Y | P | High | Incidental |
| Northern saw het owl | AS | Y | P | High | Incidental |
| Oregon vesper sparrow | SC. 3 | N | A | Low | None |
| Pileated woodpecker | SV. AS. 4 | Y | P | High | Incidental |

**Table K. Cont'd Forks Wateshed Special Species Occurrence (Codes listed at end of table)**

| OTHER (ODFW AND FS) SPECIAL STATUS SPECIES - Cont'd | | | | | |
|---|---|---|---|---|---|
| **SPECIES** | **STATUS** | **RANGE Y/N** | **P/A** | **HABITAT QUALITY** | **LEVEL OF SURVEY** |
| Pygmy nuthatch | SV. 4 | Y | P | High | Incidental |
| Red-necked grebe | SC. 2 | N | A | Low | None |
| Three-toed woodpecker | SC. AS. 4 | Y | U | Medium | None |
| Western bluebird | SV. AS. 4 | Y | P | Medium | None |
| Red tree vole | BS. SM. | Y | S | High | Limited |
| Western gray squirrel | SU. 3 | Y | P | High | Incidental |
| Pacific pallid bat | SV. AS. SM. 3 | Y | S | Medium | Limited |
| Silver haired bat | SU. Sm. 3 | Y | S | Medium | Limited |
| American marten | SV. AS. 3 | Y | P | High | Limited |
| Ringtail | SU. 3 | Y | P | Medium | Incidental |
| White footed vole | SC. SU. 3. R. | Y | U | Low | None |

## Status Codes:

FE - USFWS Endangered - in danger of extinction throughout a significant portion of its range
FT - USFWS Threatened - Likely to become endangered species within foreseeable future

SoC. - USFWS Species of Concern (formerly Federal Candidate 1, 2, 3) - under consideration for listing, but additional information is needed to support a proposal to list under the Endangered Species Act
C - Federal candidate which is likely to become an SoC when new USFWS review is completed
PE - Proposed endangered by National Marine Fisheries Service (NMFS)
PT - Proposed threatened by National Marine Fisheries Service (NMFS)

SE - State Endangered - in danger of extinction in the State of Oregon
ST - State Threatened - listed as likely to become endangered by the state of Oregon
SC - State Critical - listing is pending, or appropriate, if immediate conservation action not taken
SV - State Vulnerable - listing not imminent, and can be avoided through continued or expanded use of adequate protective measures and monitoring
SP - State Peripheral or naturally rare - populations at the edge of their geographic range, or historically low numbers due to limiting factors
SU - State Unknown - status unclear, insufficient information to document decline or vulnerability

SM - Survey & Manage - Forest plan ROD directs protection of known sites and/or survey for new sites
BS - Bureau Sensitive (BLM) - eligible for addition to Federa Notice of Review, and known in advance of official publication.
AS - Assessment Species (BLM) - not presently eligible for official federal or state status, but f concern which may at a minimum need protection or mitigation in BLM activities

R - Region 6 Regional Foresters sensitive species list for Rogue River.

1 - Oregon Natural Hertiage Rank critically imperiled throughout its range,
2 - Oregon Natural Hertiage Rank, imperiled throughout its range
3 - Oregon Natural Hertiage Rank, not rare, threatened throughout its range
4 - Oregon Natural Hertiage Rank, not rare, apparently secure throughout its range

| <u>P/A Presence, Absence</u> | <u>Habitat Qaulity</u> |
|---|---|
| P - Present | H - High |
| S - Suspected | M - Medium |
| U - Uncertain | L - Low |
| A - Absent | A - Absent |
| T - Possibly transitory | |

# APPENDIX H
# FISHERIES

# FISHERIES

## 1997 Level II Stream Surveys

*Rogue River National Forest*
*Cascade Zone:*
*Butte Falls Ranger District*

**Stream inventories conducted by:**
*Keith Casey*
*Emily Kolkemo*
*Scott Quinn*
*Will Wyatt*

**Reports complied by:**
*Keith Casey*
*Emily Kolkemo*

**Introduction**

In 1990 the Rogue River National Forest Land and Resource Management Plan initiated stream habitat surveys on all fish bearing streams. Stream surveys and designed to provide the needed baseline information on streams for ecosystem management. In the 1997 field season, the Cascade Zone fisheries crew surveyed approximately 11 miles of stream. Streams surveyed were all located on the Butte Falls Ranger District of the Rogue River National Forest including: Wallowa Creek, Whitman Creek, Spring Creek, Sumpter Creek, Nichols Creek, Wickiup Creek, Big Ben Creek and Sam Creek.

The streams were surveyed using the Hankin-Reeves level II survey, this method of surveying provided the most cost effective design for visually estimating size and quality of fish habitat along stream reaches. The estimated cost of conducting the Hankin-Reeves method of stream surveying is $1,000/ mile. The survey consists of two phases:

1) Office Phase:
This phase is designed to provide field crews with the general information regarding the streams to be surveyed. With the aid of topographic maps and aerial photos, reach breaks, sinuosity, gradient, stream length, valley width and basin area are estimated. Previous biological, land use, and historical data for each basin are also utilized , for example ODFW fish surveys and previous USFS stream inventories and watershed analysis reports.

2) Field Phase
This phase consists of two person teams working in stream identifying and visually estimating size of fish habitat and riparian conditions. The streams surveyed in the 1997 field season were not thoroughly surveyed for fish. Upper limits were determined by electroshocker, and stream surveys were conducted several hundred yards past determined upper limit points and stopped. Stream temperature was monitored by Hobo temperature gauges, however an error occurred while launching the hobo temperature recorders, temperature was only recorded for less than a month and not the three months which was originally planned on. Data gathered in the field is then returned to the office and entered into the SMART Data base for processing and summarization.***

***Problems noted:
The strict classification of pool habitat as having to span the channel width did not allow us to classify clear pool habitat as pools. Many riffles within these streams were composed of pocket pool habitat, and it was duly noted in the comments for each reach. Fish were often found in these pocket pools, and they were clearly utilizing the habitat as pools, not riffles. So it is my belief that the pool riffle ratios may be biased towards riffles.

Through observations in the field the classifications for woody debris is sufficient, but we've found that a smaller classification of wood, slash (>10 inches diameter, >10 feet long), played a vital role in sediment, and woody debris retention. By looking at the physical evidence of bankfull indicators and flood prone depths, our belief is that many of these streams don't get high enough to flush out large wood.

Problems with the SMART program include, a data entry site for visual estimates of substrate, and no computation and summarization; a print out of Wolman results, yet no data entry site within the program; marshes and braids are classified on raw data form C2, yet the smart program only allows the chutes and falls to be entered, on the hard copy of summaries marshes and braids then show up as zero percent of habitat units.

**Executive Summary**
Cascade Zone, Rogue River National Forest

Management issues, concerns, and opportunities:

- Purpose for stream surveys: Surveys will provide the needed baseline information for future management decisions. Streams were selected on the basis of stand health and previous management.

- Threatened, Endangered, and Sensitive Species (TE&S): No endangered or threatened species fish species have been reported on the Prospect Ranger District above Lost Creek Dam. The listed Coho Salmon *(Onchorynchus kisutch*) and proposed Steelhead Trout (*Onchorynchus mykiss*) are only found in watersheds below Lost Creek Dam. Sensitive species *Ascaphus trueii* (tailed frog) occurs on district and were found in these watersheds. Historic Spotted Owl nesting sites are located in a few of these sub-watersheds.

- Land Management Standards and Guidelines: The Rogue River Land and Resource Management Plan directs the forest to protect, maintain and enhance fish habitat during this planning decade, and as a habitat component of desired future conditions.

- Fisheries, riparian, and watershed restoration opportunities: 1) Evaluation of the cause of the loss of fish presence from streams that historically contained fish. 2) Riparian management which will aid in the prevention of stream bank erosion. 3) Cattle exclusion from wetlands and riparian areas. 4) Closure and removal of Roads and/or culverts which affect runoff into streams. 5) Fisheries management's focus towards native fish species rather than the introduction of Eastern Brook and German Brown Trout species. 6) The placement of in-stream habitat enhancement structures.

- Desired Future Conditions: The Forest plan proposes to maintain a diversity of riparian ecosystems on the forests. This includes the maintenance and enhancement of the riparian ecosystems with regards to streambank stability, vegetation, and terrestrial and aquatic habitats.

**Discussion of Existing Conditions**

The creeks surveyed during the 1997 field season are found in the High Cascades Physiographic Province on the Butte Falls Ranger district. This area is characterized by superficial features formed both by past glaciation and recent vulcanism that occurred during the Pliocene and Pleistocene epochs. The result is a moderating effect on the landscape, producing smooth gentle inclined surfaces with glacially scoured troughs. Fluvial erosion has so far played a relatively minor role in the formation of surfaces within this province. Slopes are gentle and smooth with most stream channels limited to glacially produced depressions. Soils produced by volcanic deposits are primarily composed of basalt and andesite, and soils that are derived from glacially deposited materials are usually of mixed mineralogy. These soils tend to have a sandy texture that are prone to excessive drainage. Glacio-fluvial deposits of stony material, termed moraines, also underlay many of the surveyed creeks. (Badura, 1977)

The Surveyed streams were all located within the principal forest zone of the high cascades. This region is characterized by several physical and biological features. The elevation of this area ranges between 3,000' and 4000'. the climate is defined by relatively dry summers and winters with rain or wet snow averaging 40-55 inches annually. Soils remain cool throughout the year. Douglas Fir, White Fir and Western Hemlock constitute the dominant vegetation in the principal forest. When managing activities in the High Cascades, several conditions should be considered depending on site specific conditions, buffers along streams may need to exceed aquatic conservation strategy guidelines due to steep unstable canyons walls. In order to maintain channel stability and the riparian ecosystem, a continuous supply of woody material is required for High Cascade streams.

Much of the upper reaches of the stream were logged during periods of little environmental protection and most likely were not surveyed for fish presence/absence. Stream buffers on upper reaches were often less than 50 feet sometimes being logged up to the edge of the stream. Fish were found in many of these reaches which have been logged with little or no buffer. The floods of early 1997 effected only Sumpter Creek and Wickiup Creek with culverts washing out high up in the drainage, stream channels filling with cobble and shifting into new channels. Wallowa creek has a deeply incised channel from USFS Road. 37 down to the confluence of Sumpter Creek. The channel was incised before the floods and most likely deepened during the floods.

Native salmonid species of the Forks area of the Upper Rogue River National Forest are *Onchorynchus mykiss* (resident rainbow trout), *Onchorynchus clarkii* (cutthroat trout), and the introduced *Salvelinus fontinalis* (eastern brook trout). Brook trout were being introduced throughout the late 1800's into the mid 1900's throughout the Rogue River basin. Another aquatic species which should be noted is *Ascaphus trueii* (tailed frog), which was found in several of the streams surveyed. A Region 6 sensitive species which needs clean cold riffle habitat to survive.

Riparian areas on these streams were generally dominated by alders, occasionally becoming impassable thickets. The thickets are very nice bird habitat, lots of warblers, sparrows and flycatchers were observed during the field season.. Small seeps and larger springs occurred frequently throughout all the reaches on each stream. These areas are very special sensitive areas, possible habitat for sensitive mollusks and other macroinvertebrates. Cattle use in the upper Rogue Watershed has occurred since the early 1890's. Poor grazing management has caused major changes in native plant composition and have had effects on stream bank stability, including compaction, and destruction of stream banks. Evidence of cattle damage on the streams surveyed in the 1997 field season occurred regularly throughout each drainage, especially higher up in each drainage where heavy logging has occurred. A group of cattle as actually in the stream in the uppermost reach of Wallowa Creek.

**Management Conclusions**

No current timber sales have occurred within these drainages, but the older sales (15+ years ago) had little of or no buffer on fish bearing streams. The units have been replanted and are re-foresting properly. As long as the riparian buffers are protected under the aquatic conservation strategy the streams should fair well in the future. New logging roads should not be built, changes in stream gradient degrade the streams as shown by the deeply incised channel below Road 37 on Wallowa Creek, and the mild downcutting above with the wash out of several small man made dams. The culvert there has altered the gradient and blown out the channel to approximately five feet below where it historically flowed.

Cattle consume riparian vegetation and prevent new seedling establishment through browsing, compaction and trampling. Riparian areas are especially sensitive to non-native undulates using the riparian corridor for grazing and traveling. Deeply cut "game" trails were a common occurrence with cow feces indicating the game as "cow". Native undulates do not damage riparian areas as cows do. Smaller groups of traveling grazers can be beneficial to riparian ecosystems, smaller hoof size and smaller herd size reduces the amount of damage which they do on streams, but large herds of large hoofed cows are damaging riparian areas. Excluding cattle from sensitive wetland/riparian areas and/or restricting cattle grazing within the forest would greatly benefit water quality, stream health and aquatic biodiversity.

Oregon Department of Fish and Wildlife (ODFW) conducted a fish inventory study in August of 1980 in the Forks area, the greatest percentage of fish they observed were rainbow trout. Very few brook trout were observed. In our electrofishing for presence/absence we found predominately brook trout, with very few rainbows found; no cutthroat trout were found but are thought to occur in these drainages. Which brings up the question "are brook trout displacing native trout?" Increase in fishing pressure on brook trout would greatly benefit the native rainbow populations. Current 1998 fishing regulations have set no limits on brook trout in the Rogue River Basin. Encouraging the taking of brook trout and encouraging catch and release fishing of rainbow trout would enhance the native populations of trout.

## Basin Summary

*Wallowa Creek*

Wallowa Creek is located within the South Fork of the Rogue River watershed basin. Wallowa creek is a tributary to Imnaha Creek. The stream was named in the 1890's by Lee Edmondson, a Butte Falls area trapper, after the major creeks in the Wallowa Mountains in northeastern Oregon where he had trapped earlier. It is a third order stream at the confluence of Imnaha Creek. Direct access to the stream is at the crossing of Road 37 in T33s, R04e sect. 15 se corner. Flow regime changes greatly the confluence of Sumpter Creek, a large second order stream contributing approximately 70% of the flow. Flow was measured near the mouth at approximately 15.2 cfs on the July 14, 1997, and in August of 1980 ODFW measured the flow at Road 37 at 0.56 cfs. The elevation Wallowa Creek is approximately 3700 feet to 4200 feet. The creek is contained within a moderately "V" shaped valley with gentle side slopes of 10-30% gradient. Approximately 1.95 miles was surveyed, from the mouth to the culvert on Road 3785-200, it was determined that no fish were above this culvert by electroshocking for 200 yards upstream.

Past glaciation of this area has resulted in the underlaying of morainal deposits. Soils in this area range from loams and sandy loams formed from glacial till deposits. Soil type allows the landscape to be well drained. The Wallowa drainage is generally flat to gently rolling till and ground moraine surfaces. These well drained soil are dominated by Douglas Fir, Mountain Hemlock and White Fir.

Oregon Department of Fish and Wildlife surveyed the South Fork area for fish in August of 1980. They surveyed upstream from USFS Road 37. The fish species they found were predominately brook trout and a few rainbow. They believed the upper distribution of fish was the confluence of the North and South forks because they felt there was too little water to support fish, however we observed fish up to Road 3785-200 on the South Fork of Wallowa Creek. The North Fork of Wallowa Creek was intermittent, flowing in spots and going subsurface in many areas. It was just a trickle at the confluence of the forks, but evidence of high flows was evident, cobble bars through the trees, overrunning the vegetation, scoured areas leaving bare tree roots etc. A considerable flow was passing through the culvert at Road 3785-200, but electoshocking for one hundred yards downstream of the culvert determined no fish were present within the stream. However, *Ascaphus trueii* larva were found in several locations throughout the North Fork. The North Fork was not surveyed because no fish were observed and the Hankin and Reeves survey is designed to observe fish habitat.

## Reach Summaries

### <u>Reach I</u>

Reach one of Wallowa Creek begins at the confluence with Imnaha creek upstream approximately 1.1 miles to the confluence of the North Fork and the South Fork of Wallowa Creek. The mapped channel gradient for reach one is approximately 3%. Sumpter Creek contributes approximately 70% flow to the lower reaches of Wallowa Creek. Above the confluence Wallowa is deeply incised up to seven feet deep, with freshly cut banks. Below the confluence the stream is wider and seemed to be able to handle the high flows which cut the deep channel upstream. The stream was walked in the summer of 1996 and was down cut then as well, the floods of early 1997 may have added to the erosion but little can be told. Our management recommendation is that the existing banks be stabilized and placing large woody debris structures assisting the stream in aggrading more substrate. The stream above the culvert was slightly incised but aged, moss and vegetation growth indicated the erosion was old. Water temperature averaged 51°F.

Substrate: this first reach was composed of larger particle size, lots of good spawning gravels and cobbles.

Wood: a major component of the woody debris in this stream was below classification standaRoads,
the slash component. Large woody debris was computed at approximately 69 pieces per mile.

Pools: 4.6% of all units were pools, however due to classification limitations much of the pocket pool habitat was lumped into the riffle habitat. Most pool habitat was formed by woody debris, such as plunge pools, underscour pools and dam pools.

Riparian: In the inner riparian zone the tree ranged from sapling pole(1%) to large tree(68%). Alders made up the streamside vegetation with hemlocks and Douglas firs making up the larger trees. The outer riparian was dominated by large Douglas firs and western hemlocks.

Fish: brook trout were found in the stream above and below Road 37 by electrofishing.

## Reach II

This reach begins and the confluence of the North and South forks of Wallowa Creek. The reach is actually the south fork. The north fork of this stream was mostly subsurface and did not appear to have fish. From the confluence to the culvert at Road 3785-200 is approximately 0.87 miles. The mapped channel gradient for this reach is about 9.3%. Approaching the theoretical limit for fish presence, yet fish were found throughout the reach up to the culvert at Road 200. Near the top of the reach evidence of several man made dams was observed; piled cobble and gravel lined with black plastic. They appeared to have once spanned the channel but had since blown out. Evidence in the down cutting of the channel may be a result of the change in gradient because these dams have been blown. A deeply eroded 45' cascading riffle flowing beneath roots of some riparian trees was found just above one of these historic dam sites, and is thought to be a possible fish barrier. Water temperature in this reach averaged 52°F.

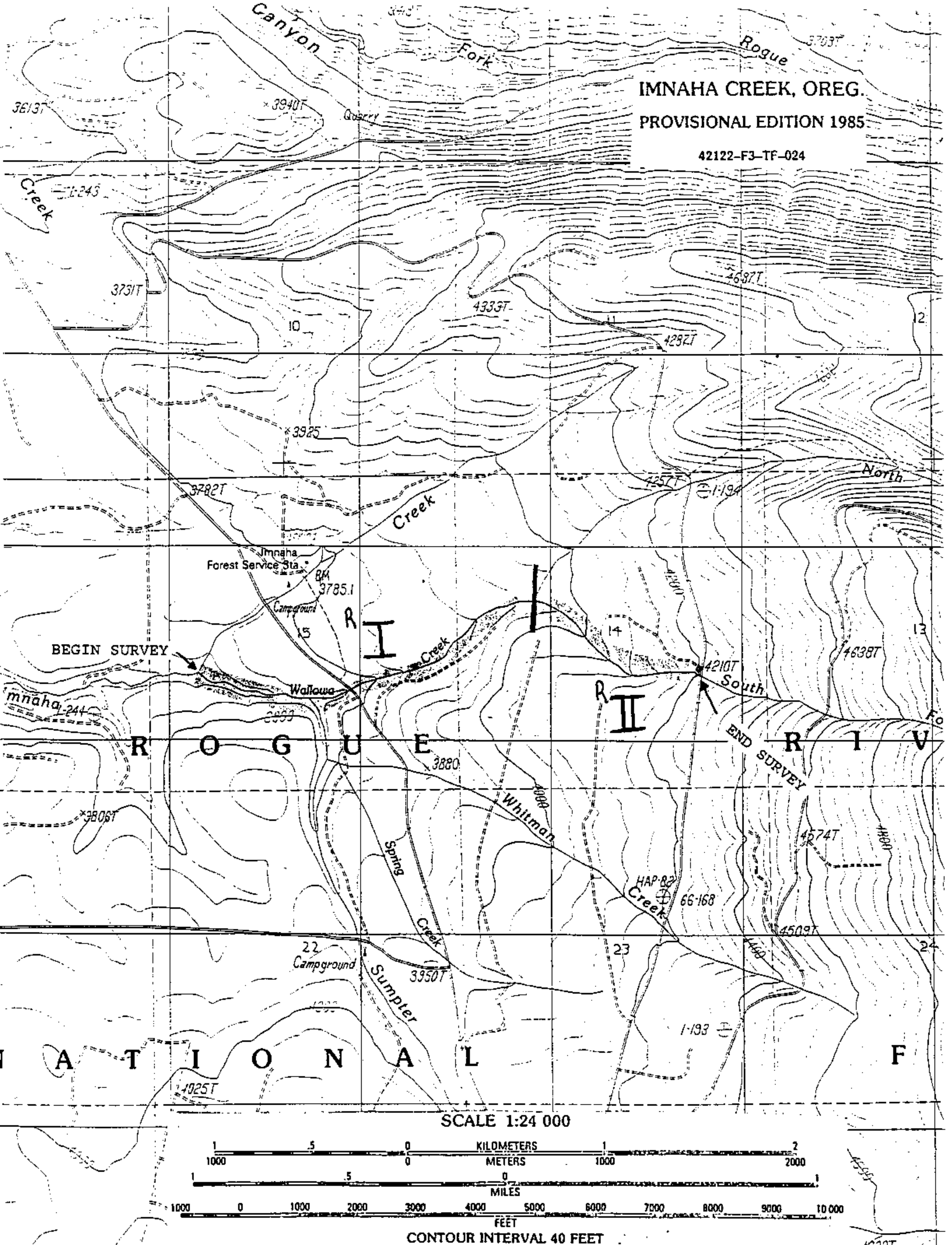
Substrate: gravels and cobbles dominated this higher gradient reach, good stretches of spawning gravels. (see Figure 1b)

Wood: slash again plays a major role in the composition of the stream system. Many of the falls within this reach were over woody debris dams, one as high as 3.5' There was approximately 32.3 pieces of large woody debris per mile.

Pools: Much of the pool habitat within this reach was lumped into riffle habitats due to classification limitations. Many of the fish visually observed during the surveying of this creek were spotted in pocket pool habitat within riffles. According to the SMART report only 3.02% of all habitats were classified as pool habitat.

Riparian: This upper reach has been heavily logged in the past with several units coming to stream edge. Small trees made up 100% of the riparian with Douglas fir making up the over story and vineleaf maple making up the understory. The outer riparian was also composed of 100% small trees with Hemlocks and Douglas firs composing the dominant species.

Fish: The stream was electoshocked above and below the culvert on Road 3785-200 and two brook trout were observed. Stream gradient between Roads 3785-200 and 3785 was too great to support fish. No fish were found.


IMNAHA CREEK, OREG.
PROVISIONAL EDITION 1985
42122–F3–TF–024
Canyon
Fork
Rogue
Quarry
Creek
North
Imnaha
Forest Service Sta.
BM
3785.1
Campground
BEGIN SURVEY
R I
R II
Creek
Wallowa
Imnaha
South
END SURVEY
R O G U E
R I V
Whitman
Spring
Creek
HAP 82
Creek
Campground
Sumpter
N A T I O N A L
F
SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 40 FEET

**Basin Summary**

*Whitman Creek*

Whitman Creek was named in the 1890's by Lee Edmonson, a Butte Falls area trapper who named the stream after major creeks in the Wallowa Mountains. He had previously trapped in this Northeast area of Oregon before traveling to Butte Falls (LaLande, 1995). Whitman Creek is located in the Imnaha quadrangle of the Rogue River National Forest. It begins in the Sky Lakes Wilderness Area and extends westwaRoad, passing into Forest Service land where it crosses Road 3785, 200, 280, 930, 37, and 567. Above Road 930, Whitman Creek had a dry streambed, so one reach was assessed for the stream from its confluence with Sumpter Creek to Road 930. The total survey mileage was 0.41 or 2,143 feet.

Whitman Creek ranges in elevation from 3,800 to 4,000 feet. This creek is contained within a moderately V-shaped valley that has sideslope gradients between 30-60%. The soils near the creek vary in depth to substratum between 50-80 inches and are composed primarily of cobble loams that are rapidly permeable and well-drained. There is a slight potential for the soils in this area to erode. Due to the relative steepness of the sideslopes and erosional potential, Whitman Creek may be more susceptible to management activities conducted within the valley.

Whitman Creek has one tributary, Spring Creek, just above it's mouth, but is mostly spring-fed for almost its entire length. Before the confluence with Spring Creek, discharge in Whitman Creek was calculated at 1 cubic foot per second. Whitman Creek, along with Spring Creek, contribute approximately 85% to the flow of Sumpter Creek. The average temperature of the stream was 47°F (8°C), an ideal temperature to sustain spawning Rainbow trout (*Oncorhynchus mykiss*).

Brook Trout (*Salvelinus fontinalis*) were the only species of fish found in Whitman Creek. A previous survey by the Oregon Department of Fish and Wildlife found a few Rainbow Trout in the stream, so Brook Trout may have displaced Rainbow Trout from precious habitat.

Whitman Creek is characterized as having a low gradient (<2%) streambed that meanders through well-defined floodplains. Sufficient amounts of gravel within the riffle areas were present to accommodate spawning beds. One side channel may provide nursery area for juvenile fish. Woody debris was lacking in Whitman Creek, resulting in inadequate cover for fish. A few wood debris jams did slow the water, however, creating small pools. Culverts formed almost ideal pool habitats, but the culvert at Road 37 may be a possible fish barrier due to it's 2 foot high jumping distance. Above Road 37, no fish were found. Considerable shading of the stream occurred as a result of dominant upslope conifers.

Human activity does not seem to have adversely impacted fish habitat at Whitman Creek. There are no campgrounds or picnic areas along the creek, and no cattle damage was observed near the stream. Although several Roads cross the Whitman Creek streambed, only a few cross the wetted stream portion and no sedimentation seems to have occurred at these junctures.

**Reach Summary**

**Reach 1**

Reach 1 of Whitman Creek begins at its confluence with Sumpter Creek and extends for 0.41 miles or 2,143 feet until it reaches Forest Service Road 200. The valley form of this reach is narrow and V-shaped, with steep side slope gradients greater than 60%. The channel gradient is 7%, with a sinuosity of 1.0 and an average stream width of 8 feet. Two small spring seeps contributed to the flow of 1 cubic foot per second (cfs) recorded near the mouth of the stream.

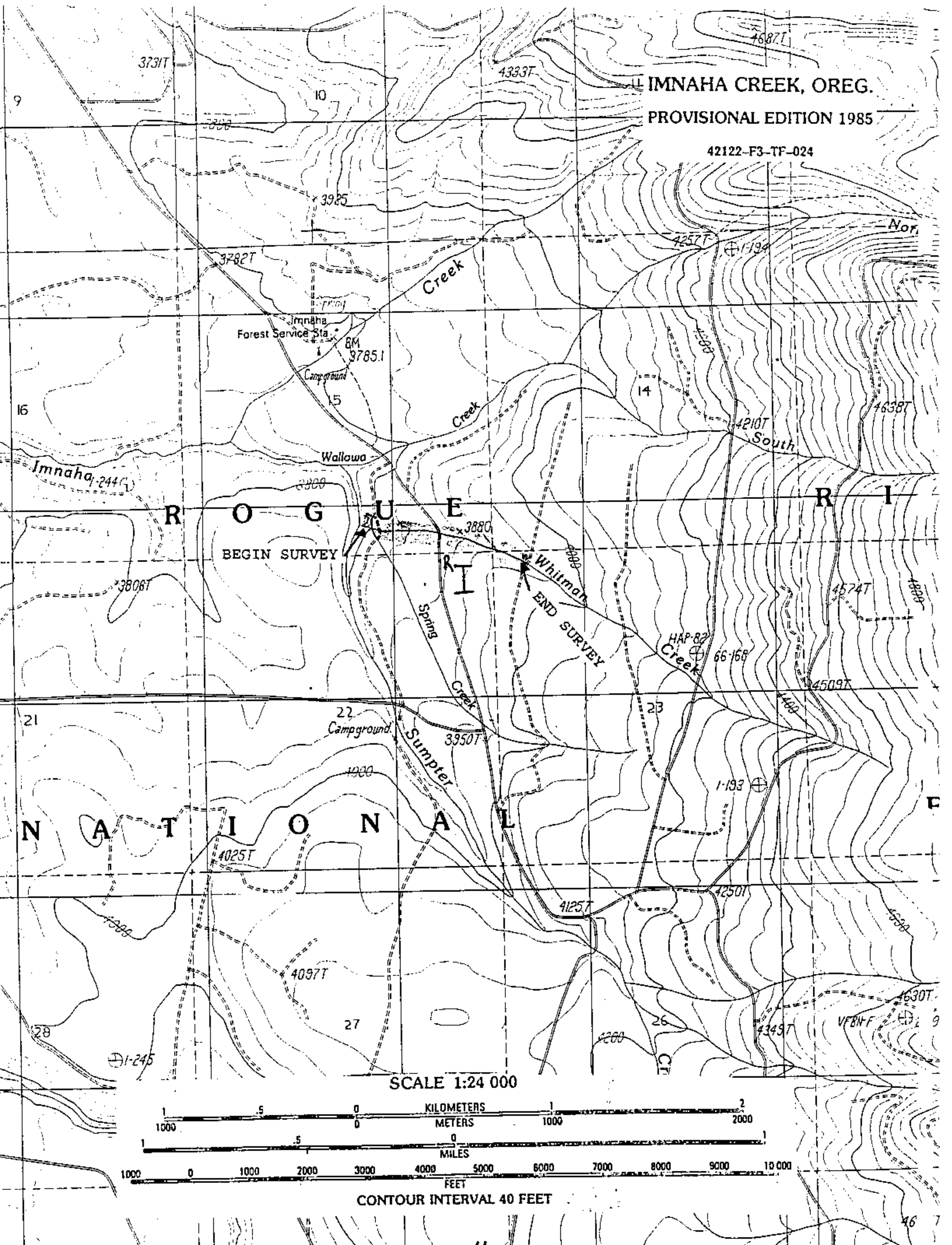
Substrate: Gravel consists of over half of the substrate composition, followed by cobble and some sand. This composition occurs roughly in the same proportions throughout the reach.

Wood: A total of 110 pieces of wood per mile of slash, small, medium, and large wood were counted at this reach. Slash and small wood is abundant with only a few medium and large pieces present in the stream.

Pools: Riffles are the main component of the stream habitat. There are a few pools, many of which have been formed by woody debris jams. One side channel and 2 culverts with pools are also present.

Riparian: small hemlock and douglas fir trees (base diameter between 8"-21") dominate both the inner and outer zone of the riparian area. Due to the closed crown canopy of the small trees, these zones are characterized by little ground vegetation.

Fish: One Brook Trout approximately 6 inches long was observed in a pool below the culvert at USFS Road 37.


IMNAHA CREEK, OREG.
PROVISIONAL EDITION 1985
42122-F3-TF-024
ROGUE RI
NATIONAL
BEGIN SURVEY
END SURVEY
Imnaha Forest Service Sta.
BM 3785.1
Campground
Wallowa
Creek
Imnaha
Whitman
Creek
Spring
Creek
Sumpter
South
HAP-82
66-168
1-193
1-194
1-244
1-245
VFBN-F
3731T
4333T
4687T
3925
3782T
4257T
4210T
4638T
4574T
4509T
3880
3806T
3950T
4025T
4125T
4250T
4097T
4345T
4630T
9
10
14
15
16
21
22
23
26
27
28
46
SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 40 FEET

**Basin Summary**

*Spring Creek*

Spring Creek is located in the Imnaha quadrangle of the Rogue River National Forest. It begins down from Forest Service Road 280, crosses roads 930, 37, and Road 567. Only one reach was assigned for this creek. The creek was surveyed from it's confluence with Whitman Creek to midway between Road 37 and 930 for a total of 0.93 miles or 4,890 feet.

Spring Creek spans in elevation from 3,800 to 4,000 feet. The creek is contained within a bRoad, open valley that has short, gently sloping side slopes with moderate gradients ranging between 5-30%. The soils near the creek range in depth between 40-50 inches to substratum and are composed of fine gravels and sandy loams that are rapidly permeable. The potential of soil erosion near the creek is low.

Spring Creek is a class 1 stream fed by at least two springs and has no tributaries. Discharge, taken before Spring Creek's confluence with Whitman, was calculated at between 7-8 cubic feet per second, contributing approximately 85% of the flow. The average temperature of the stream was 44°F, with one spring feeding 41°F water into the stream. These low water temperatures may retaRoad the growth of salmonid fish in the stream. Due to it's spring-fed nature, flow and temperature in Spring Creek do not vary significantly throughout the year.

This stream has not been previously surveyed, so no data exists on historical fish presence or habitat conditions. Our survey found several Brook Trout (*Salvelinus fontinalis*) and one Rainbow Trout (*Oncorhynchus mykiss*) present. No fish were found above Forest Service Road 37, possibly due to the extremely long culvert (55 feet) present at that Road.

Spring Creek is characterized as having a moderate streambed gradient between 2-4% and maintains very stable banks. Riffles dominated the stream channel with infrequently spaced pools, one of which was created by a culvert. Several pocket pools within riffle areas were present, however, to provide fish protection from predators. One side channel was present in this stream, possibly furnishing a nursery area for juvenile fish. The substrate had sufficient amounts of gravel for spawning beds and adequate amounts of wood were present to provide cover for fish. The riparian zone provided ample shade to the stream with a canopy of mostly small and large conifer trees.

Spring Creek does not seem to be adversely affected by human activity. No visible cattle damage had occurred along the stream or within the riparian zone. Sedimentation does not seem to have occurred where Roads cross the stream, however, Road 37 has reduced some of the riparian cover and the length of it's culvert may be a possible fish barrier.

**Reach Summary**

Reach 1

Reach 1 for Spring Creek begins at its confluence with Whitman Creek and extends 0.93 miles or 4,890 feet upstream until it reaches Forest Service Road 200. The valley form of this reach is open and through-like with short side slope gradients between 30-60%. The channel gradient is 4%, with a sinuosity of 1.2, and an average stream width of 28 feet. The temperature of the stream in this reach averaged 44° F. One tributary contributes approximately 30% of the 7 cubic feet per second (cfs) flow recorded near the mouth of the stream.

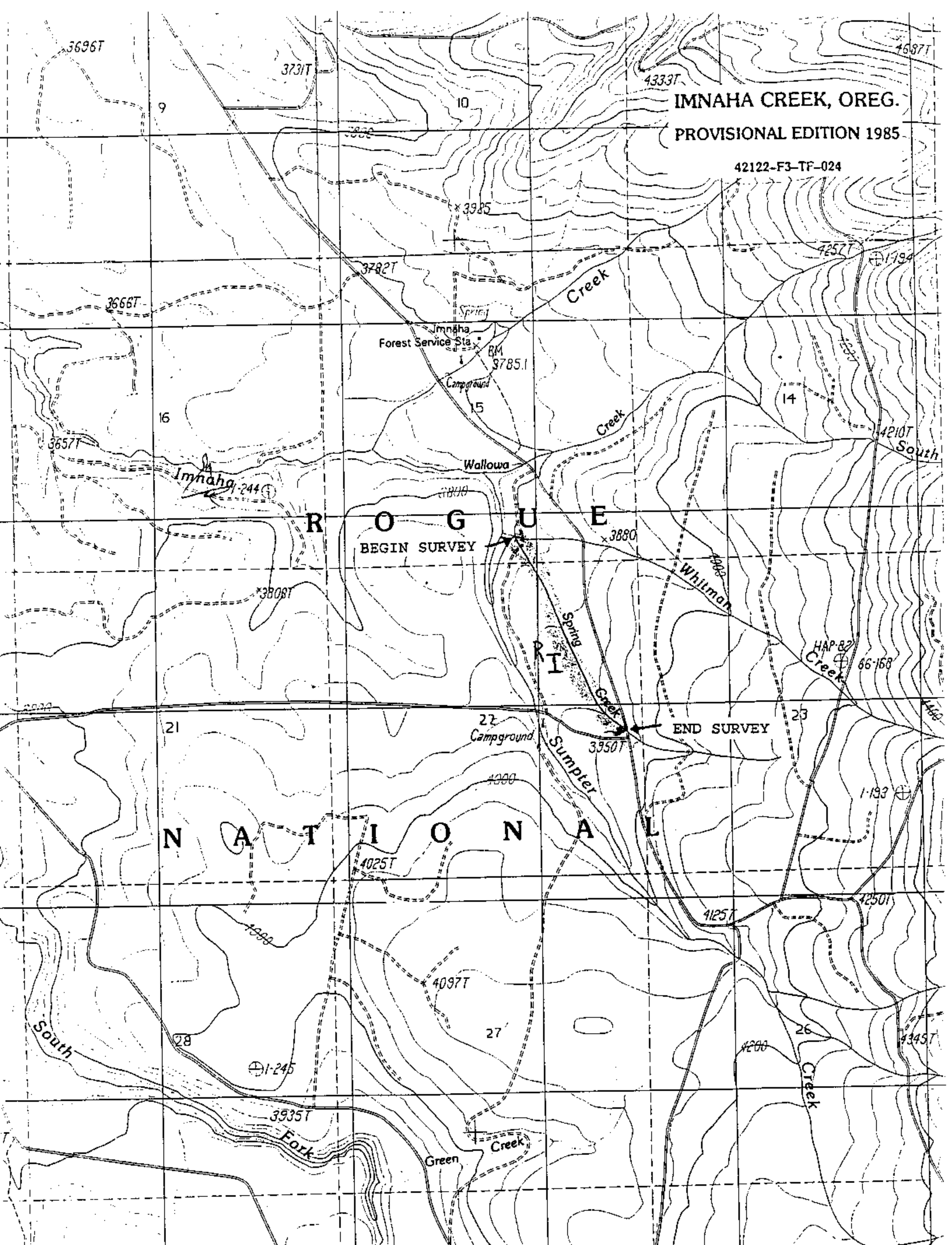
Substrate: Gravel dominates the overall substrate composition with a few areas of high sand and silt concentration and some cobble scattered throughout.

Wood: A total of 278 pieces per mile of slash, small, medium, and large wood was present in this stream reach. Slash and small wood comprise 88% of all the wood pieces, with some medium wood distributed throughout the reach and only 2 pieces of large wood in the entire stream reach.

Pools: Statistically, this stream reach is composed of 100% riffle habitat units. There is one pool present for the entire stream reach. Pocket pools are present, however, throughout this reach, but are counted within the riffle habitat units. One side channel, one 3 foot falls, and one culvert with a pool occur in this stream reach.

Riparian: The inner 25 foot riparian zone is dominated by small yew and douglas fir trees. A few sapling (base diameter <8") yews and hemlock are also present in this zone. The outer 75 foot riparian zone is characterized as a mature condition with large douglas fir and hemlock trees (base diameter between 21"-32") dominating with a few smaller hemlocks in the understory.

Fish: One Rainbow (ONMY) and several Brook Trout (SAFO) between 2-5 inches were observed in pools.


IMNAHA CREEK, OREG.
PROVISIONAL EDITION 1985
42122-F3-TF-024
BEGIN SURVEY
END SURVEY
R O G U E
R I
N A T I O N A L
Imnaha Forest Service Sta
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Campground
Spring
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Creek
Spring
Creek
Sumpter
South
Fork
Creek
Green
Creek
South
Creek
3696T
3731T
4333T
4687T
3985
3782T
3666T
4257T
3657T
3880
3808T
3950T
4210T
4025T
4125T
4250T
4097T
3935T
4345T
4000
4200
HAP-82
66-168
1-244
1-245
1-193
1-194
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22
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26
27
28

**Basin Summary**

*Sumpter Creek*

Similar to the other creeks of this region, Sumpter Creek was named by Lee Edmondson, a Butte Falls area trapper who had trapped earlier in the Wallowa Mountains and named creeks in the Butte Falls area after the creeks he trapped on in the Wallowas. The 1997 stream survey covered from the mouth at the junction of Wallowa Creek to just below Road 3780-500. The stream at this point becomes too marshy and braided. No fish were discovered using electoshocking technique. Sumpter Creek has direct access in several places, Road 3775-500 (location of Sumpter Creek campground), Road 37, Road 3785-200 and Road. 3780-500. Sumpter creek is a third order stream at the confluence with Wallowa, but is predominantly a second order stream above the confluence of Spring Creek. The elevation ranges from 3760' to 4680'. Flow on July 17, 1997 was 9.4 cfs. Spring and Whitman Creeks contribute significant flow to the lowest stretch of Sumpter; the 1997 flow measurement on Spring Creek was 7.1 cfs being contributed to the flow of Sumpter Creek.

Sumpter is found in the High Cascade Physiographic region and is characterized by gently rolling broad surfaces with variable micro-relief. This area is just below the glacially sculpted areas of this watershed. The predominate underlying rock found here are the basalt and andesite of volcanic origin. Above Road 37, however, glacial till is the most common substrate matter. Both soil type areas are well draining.

Oregon Department of Fish and Wildlife's August 1980 survey of this stream determined a similar upper distribution description of the stream becoming too marshy to support fish. Also their electroshocking of the North and Middle forks also found no fish below or above Road 3780-200. The predominant fish found by ODFW were rainbows, with a few brook trout. USFS electroshocking on July 21, 1997 found equal amounts of brook trout and rainbows. At Road 200
shocking below resulted in a 15 cm *Salvelinus fontinalis* and above resulted in a small *Onchorynchus mykiss*. No fish were found below Road 3780-500 for over 300 ft of shallow marshy creek meanders. Visual observations made during the survey mirrored the electroshocking findings by ODFW in 1980; many more fish were observed in the lower reaches of the stream than in the upper reaches.

**Reach Summaries**

<u>Reach I</u>

This reach begins at the confluence with Wallowa Creek and continued upstream approximately 1.8 miles to the culvert at Road 37. The lower reaches of Sumpter Creek good amounts of small class large woody debris. Pool habitat centered around woody debris in this reach. One dam pool had approximately eight salmonids cruising and surface feeding, they were most likely brook trout. Wood dams were especially important in the retaining of fine sediment. One log jam measured approximately six feet high with gravel aggraded up almost to the top of the dam. The stream had push around forming one of the side channels described below. Above Sumpter Creek Campground the stream has three channels which run parallel to each other; the main channel is slightly lower than the two outer channels. The channels are separated by small vegetated cobble bars. The left bank side channel is very marshy in areas, several juvenile salmonids were seen darting from pool to pool in the side channel habitat. Good rearing area, away from fast currents and full of aquatic insect larvae. The mapped channel gradient for this reach was approximately 3.8%. Water temperature in this reach averaged 56°F.

Substrate: Reach I's substrate is predominately gravel and cobble, large areas of spawning gravels are present throughout this reach.

Wood: Small woody debris and slash made up the bulk of the woody debris Reach one. 207 pieces of slash made up the bulk of woody debris dams and played a important role in sediment retention.

Pools: According to the smart report only 2.51% (6.9 pools per mile) of habitat units were pools. As stated earlier much of the pool habitat found in this reach had to be lumped into riffle habitat due to classification standards. Average residual pool depth was 1.67 feet.

Riparian: Both inner and outer riparian zones the dominant size class of tree was small tree. In the lower reaches the reasons for this could be complex, old fire regimes perhaps has not allowed trees to mature.

Fish: Thirteen brook trout, ranging in size, were visually observed in this reach. At the first culvert (Road 3775-500) a 5" brook was caught by hook and line, and below the culvert on Road 37 a 17 cm rainbow trout was caught by electrofishing.

Reach II

This reach begins above the culvert at Road. 37 and continues up stream approximately 1.9 miles to Road 3780-500. The mapped channel gradient is 4.9%. Two of Sumpter Creek's forks flow into this reach, tow fish were found in the North Fork pools. The North Fork contributes approximately 60% of the flow to the mainstream. The mainstream was 53°F above the confluence and the North Fork was 52°F. Bank scuffing and erosion due to cattle grazing was evident in several habitat units in this reach. Many springs and seeps were contributing to the flows. The uppermost stretch of this reach was dominated by shallow marshy areas which lacked depth to support fish. Multiple braiding through the duff and spring seeps dominated this area. Just above Road. 3780-500 the creek's multiple channels spring from the ground, adjacent to a large clear cut.

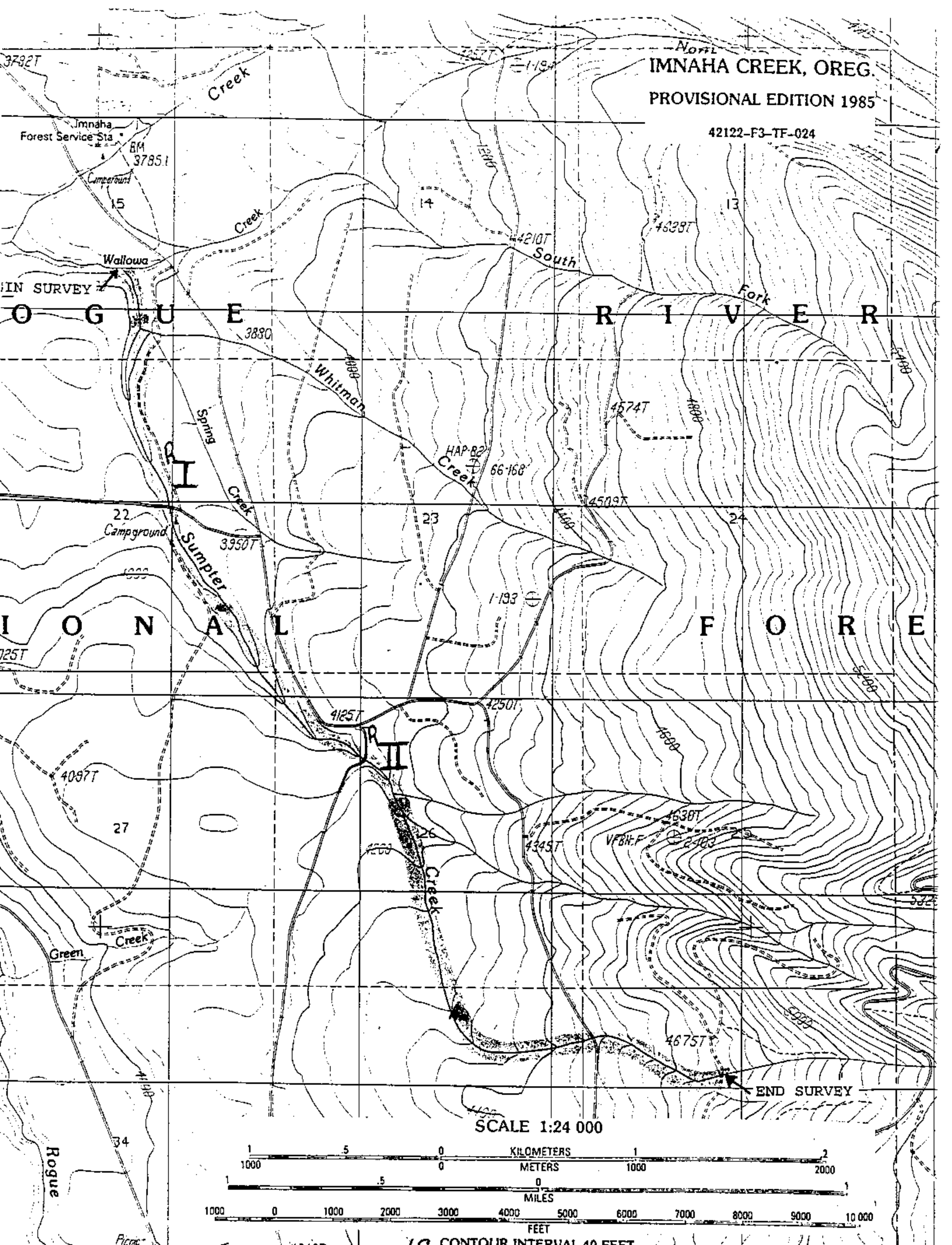
Substrate: Reach II is predominately sand and gravel, with the larger size substrate playing a more dominate role.

Wood: Slash was dominant woody material contributing to the retention of substrate, and woody debris. Most of the slash in the upper reaches was logging slash, cut ends etc. There was 169 pieces of slash in this reach.

Pools: According to the SMART data report only 4.5% of habitat units were pools (9.65 pools per mile). Much of the pool habitat being utilized by fish were pocket pool lumped into riffles because of classification restrictions.

Riparian: In the upper reaches the riparian area has been logged. So tree growth is definitely young, within the past 30 years. Inner and outer riparian zones were dominated by small trees. Inner riparian was dominated with Hemlock with yew in the underscore. Outer riparian was predominately hemlock.

Fish: Fish were visually observed throughout the reach, especially in pocket pool habitat. Four brook trout were Electoshocked up in the 200' above Road 37, rainbow and brook trout were electro shocked up above and below Road 200. No fish were Electoshocked below Road 500.



IMNAHA CREEK, OREG.
PROVISIONAL EDITION 1985
42122-F3-TF-024
Imnaha Forest Service Sta
BM 3785.1
Campground
Wallowa
Creek
South
Fork
North
BEGIN SURVEY
ROGUE RIVER
NATIONAL FOREST
Whitman Creek
Spring Creek
Sumpter Creek
HAP-82
66-168
I-193
VFBN-F
I
II
R
Campground
Green Creek
Rogue
END SURVEY
3782T
4210T
4628T
3880
4574T
4509T
3950T
4125T
4250T
4097T
4630T
4345T
4675T
15
14
13
22
23
24
27
26
34
SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET
CONTOUR INTERVAL 40 FEET

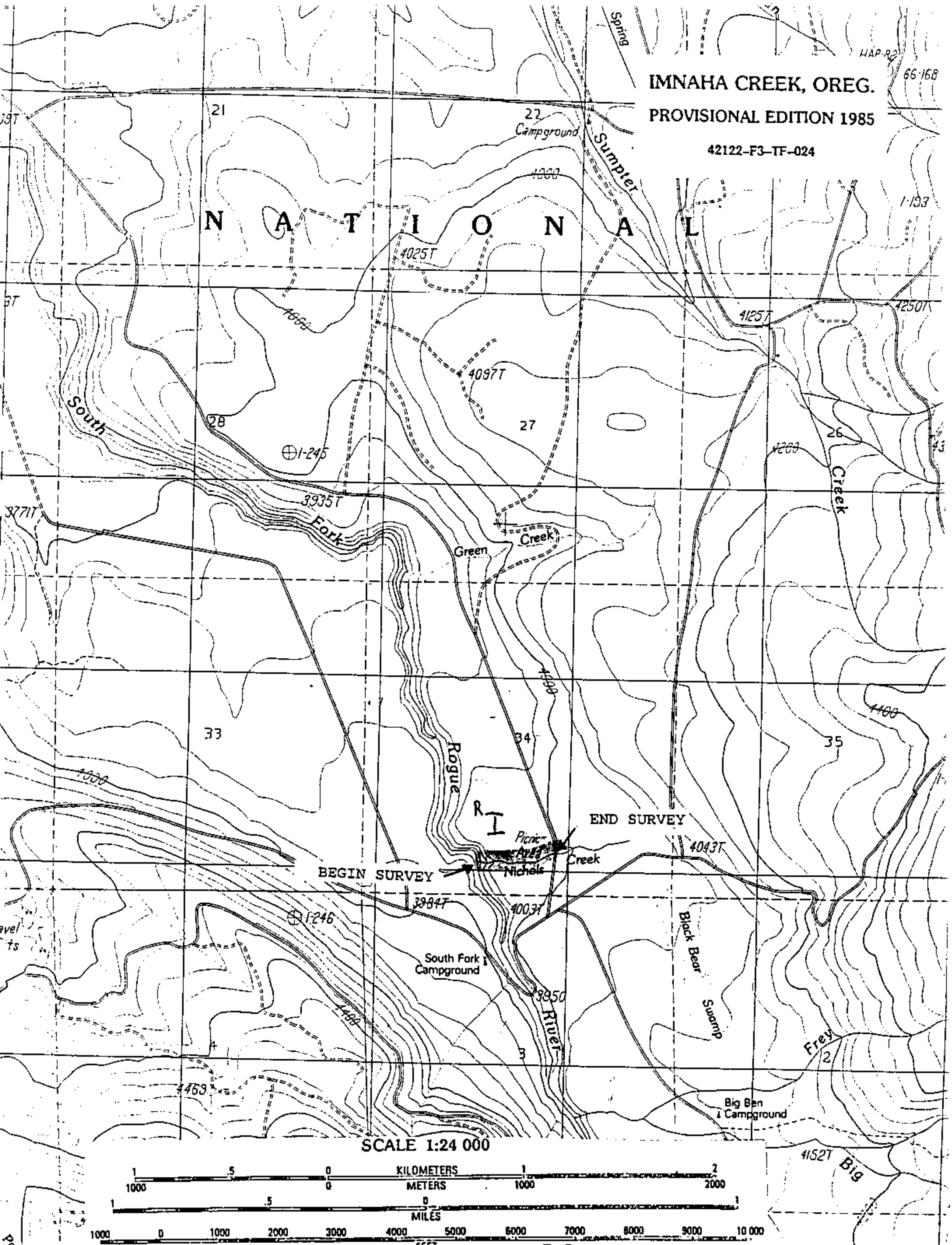
**Basin Summary**

*Nicholls Creek*

Nicholls creek is a short, high gradient first order creek flowing into the South Fork of the Rogue River. Nicholls Creek was probably named in 1907 by Forest Service trail builders after William Nicholls, the trail-crew foreman. The Nicholls family had settled in the Big Butte area during the late 19th Century. This small creek was contributing 2.8 cfs to the South Fork on July 14, 1997. The surveyed length of this stream was from the mouth to Road.3775 at the culvert a distance of approximately 0.2 miles, ranging in elevation of approximately 3860 to 4000 ft. Above Road 3775 the stream was marshy and braided unable to support fish. The stream temperature measurements were 47°F on July 2, 1997, and 51°F on the 14th of July.

This stream is locate in the non-glaciated high cascades physiographic province. The area is characterized by gently rolling hills ranging from 5-25% gradient. The parent rock of this area is mostly andesite and basalt and braccia. It is a short high gradient (6.9% mapped gradient). The first several hundred feet of the stream are cascading or high gradient riffles. Only 12 habitat units were recorded. Mostly riffles with two pools. Again most of the pool habitat was unable to be recorded as such due to classification standaRoads. Small pocket pools and plunge pools were unable to be recorded as pool habitat. Two man-made log dams had been built changing the streams gradient and characteristics. The backwater of the dams have been silted up significantly sedge and aquatic vegetation matts have formed in these areas and are two feet deep in some areas.

ODFW's August 1980 Fish inventory found all rainbow trout ranging from 15 cm to 6 cm. Our electrofishing resulted in one cutthroat approximately 5 inches, three brook trout ranging from 2 inches to six inches and one unknown one inch salmonid. The creek does get minimal fishing pressure from the campground adjacent to the creek at Road 3775. Riparian condition was good with douglas fir making up much of the understory and Ponderosa pines making up the overstory. Data was run for this report but due to the streams short length it is felt that the data may be suspect. Survey lengths are suggested to be over 0.5 miles to begin to become more accurate in the report phase of the survey. However please refer to the data which is included in this reports appendices for specific data.


IMNAHA CREEK, OREG.
PROVISIONAL EDITION 1985
42122-F3-TF-024
N A T I O N A L
Campground
Sumpter
Spring
South
Fork
Green
Creek
Rogue
River
END SURVEY
BEGIN SURVEY
R
Picnic Area
Nichols
Creek
South Fork Campground
Black Bear
Swamp
Frey
Big Ben Campground
Big
4025T
4097T
3935T
3771T
4125T
4250T
4043T
3984T
4003T
3950
4152T
4463
1-245
1-246
21
22
27
28
26
33
34
35
SCALE 1:24 000
KILOMETERS
METERS
MILES

## Basin Summary

*Big Ben Creek*

Big Ben Creek is a second order stream flowing out of the Sky Lakes Wilderness Area. It is fed by Fantail and Frey Creeks. Big Ben Creek was named in 1907 by Forest Service Trail-builders after Ben Howe, a member o the trail crew. The trail extended south from Prospect over the Cascades to Upper Klamath Lake near Rocky Point. The stream was surveyed from the mouth on the South Fork of the Rogue River to the Sky Lakes Wilderness Area boundary, approximately 1.3 miles. The mapped channel gradient from the mouth to Fantail Creek is approximately 3.9% and above that the gradient increases to approximately 8.1%. Direct access to the creek is only obtained at the Road 37 crossing. Big Ben Campground is located at that point.

The stream is in the Glaciated High Cascade physiographic province. This basin is characterized by broad, smooth, gently sloping glacial till and morbific side slopes and ridge tops with gradients from 5-45%. Parent rock of this area is predominately compacted glacial till.

According to the ODFW 1980 report only rainbow trout were Electoshocked from the stream. And our shocking only shocked up one brook trout at Road 37. No other fish sampling was done on this creek. ODFW did not determine an upper distribution, but guessed the upper limit to be 1/4 of a mile east of the sky lakes boundary. The report also reported some fishing pressure and stated that creating additional pool habitat could create better fishing in the area.

## Reach Summary

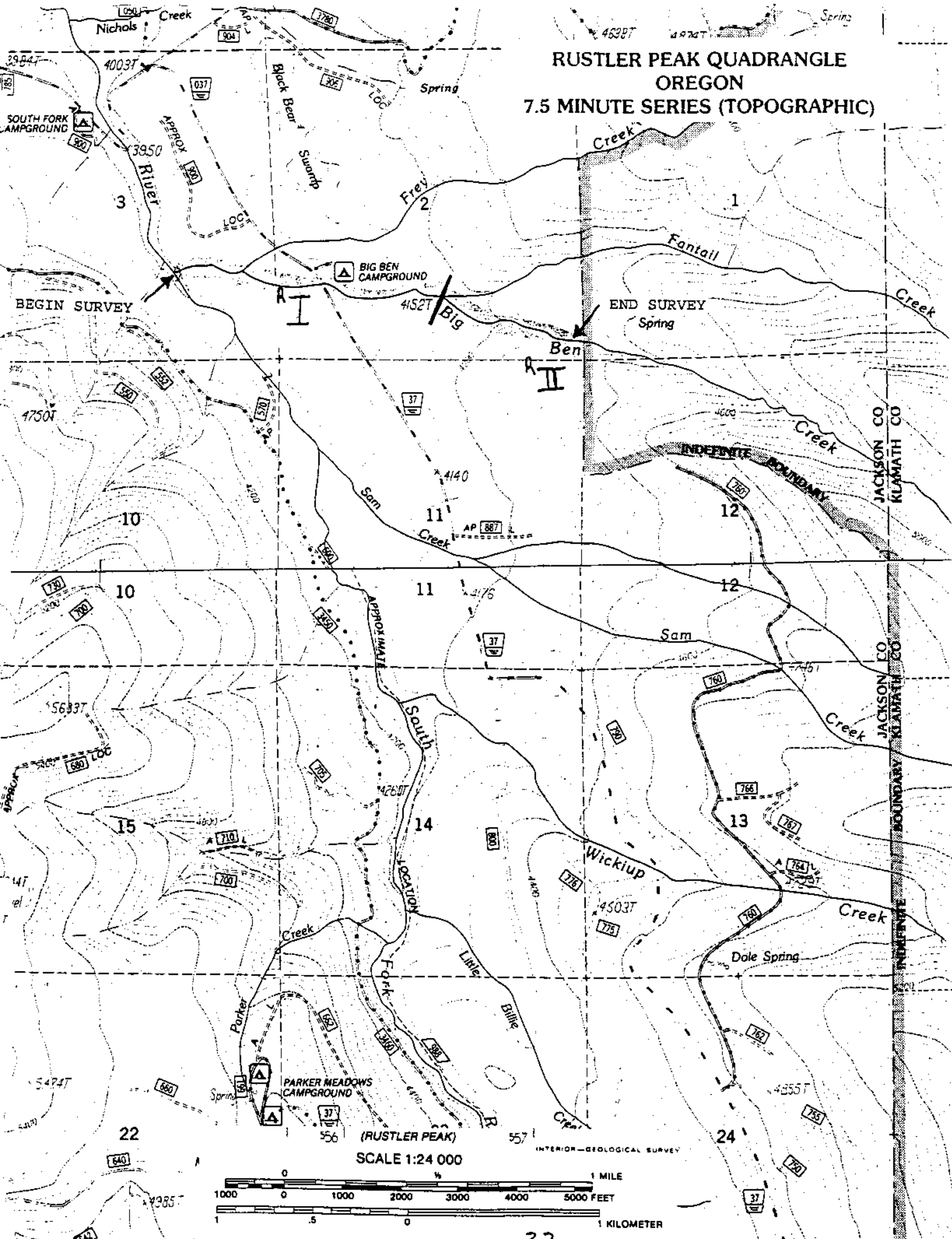
Substrate: consists of mainly larger sized particles with cobble and gravel and cobble making up the bulk.

Wood: Slash is a major component in this stream, in a few spots woody material has formed small dams, one up to five feet high and are backing up fines and other material.

Pools: there were eight pools in this reach, (6.2 pools/mile). However, many pools which did not meet survey protocol were lumped in with riffle habitat.

Riparian: was dominated by large trees with douglas fir and hemlock being the dominant species. Along the stream a healthy growth of alders generally shaded the stream.

Fish: Only a single brook trout was shocked up at the crossing of Road 37. However trout were visually observed throughout the reach. ODFW also observed fish throughout this reach.


RUSTLER PEAK QUADRANGLE
OREGON
7.5 MINUTE SERIES (TOPOGRAPHIC)
BEGIN SURVEY
END SURVEY
R I
R II
BIG BEN CAMPGROUND
SOUTH FORK CAMPGROUND
PARKER MEADOWS CAMPGROUND
Nichols Creek
Black Bear Swamp
Frey Creek
Fantail Creek
Big Ben Creek
Sam Creek
South Fork River
Wickiup Creek
Little Billie Creek
Parker Creek
Dole Spring
Spring
INDEFINITE BOUNDARY
JACKSON CO
KLAMATH CO
APPROXIMATE LOCATION
(RUSTLER PEAK)
INTERIOR—GEOLOGICAL SURVEY
SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 FEET
1 KILOMETER
CONTOUR INTERVAL 40 FEET

## Basin Summary

*Sam Creek*

Sam Creek is a second order tributary flowing out of the Sky Lakes Wilderness Area into the South Fork of the Rogue River. Direct access to the creek is acquired at the Road 37 crossing and Road. 37-760. (However, as of this writing the Road 37-760 does not reach Sam Creek, the culvert at Wickiup Creek was washed out in the January 1997 floods). Sam Creek is dry above Road 760, the stream is subsurface for approximately fifty feet below the culvert and it reappears. Sam Creek was named by the 1907 USFS trail-builders after Sam Scenting, the Ranger at Pelican Bay and later Deputy Forest Supervisor. The mouth is best approached from across the South Fork from Road 3450-570 and heading upstream.

The stream basin is located in the glaciated High Cascades, parent rock is predominately compacted glacial till. Land form description is characterized as lateral morbific side slopes. On July 30,1997 approximately 4.6 cfs was draining from the watershed into the South Fork. Approximately 1.27 miles of stream was surveyed, from the mouth to Road 37-760. The average mapped gradient of the stream was 2.7% from the mouth to the unnamed tributary, and approximately 10% above the tributary to the culvert on Road 37-760.

The August 1980 ODFW fish inventory report had three rainbow trout being electro fished from the stream the largest being 17.6 cm and the smallest 14.3 cm. According to their report the stream was of moderated gradient, dense growth of aquatic vegetation, and the substrate was predominately silt, very little spawning gravel. Fish had slender appearance and large eyes. The stream was very characteristic of streams we've surveyed on our district with alder thickets making it very difficult to electrofish,

## Reach Summary

### <u>Reach I</u>

This reach begins at the mouth and continues up to Road 37, an approximate length of .39 miles. A lot of moss covered slash and rocks, evidence of little flow fluctuation. This reach is a flat valley bottom, alders are growing on slash matts covering the stream. The stream has lots to instream wood, floating islands and only a few pools.

<u>Substrate</u>: the substrate was noted by surveyors to as slightly embedded throughout reaches one and two.

<u>Wood</u>: a lot of small woody debris and slash make up a large portion of the woody debris in this stream. Alder islands suggest very little high flows occur to flush the system of its smaller diameter woody debris. The lack of number in large class woody debris is evidence of the young forest.

<u>Pools</u>: there were 5.6 pools/mile; again, much of the pool habitat had to be lumped in with riffles due to classification standards used in this survey.

Riparian: The inner riparian zone is predominately sapling pole size class composed of mostly yew and alder; the outer riparian zone was composed of large spruce trees.

Fish: no fish were recorded by the observers, however the 1980 ODFW fish inventory found rainbow trout up to 17.6 cm. Their notes recorded that it was difficult to electroshock this stream due to the alder thickets.

**Reach II**

This reach begins at the Road 37 crossing and continues up to Road 37-750, a distance of approximately 0.87 miles. Above Road 37-750 the stream is subsurface or dry, and below the culvert the stream runs subsurface for about 50 ft. Throughout the reach the there are several spots where the stream flows subsurface; described by the observer as braided, subsurface through yew roots and duff for approx 500 ft, intermittent marsh-like riparian, a lot of water spread out in little intermittent subsurface braids. The mapped gradient of this section of stream was approximately 10.0%.

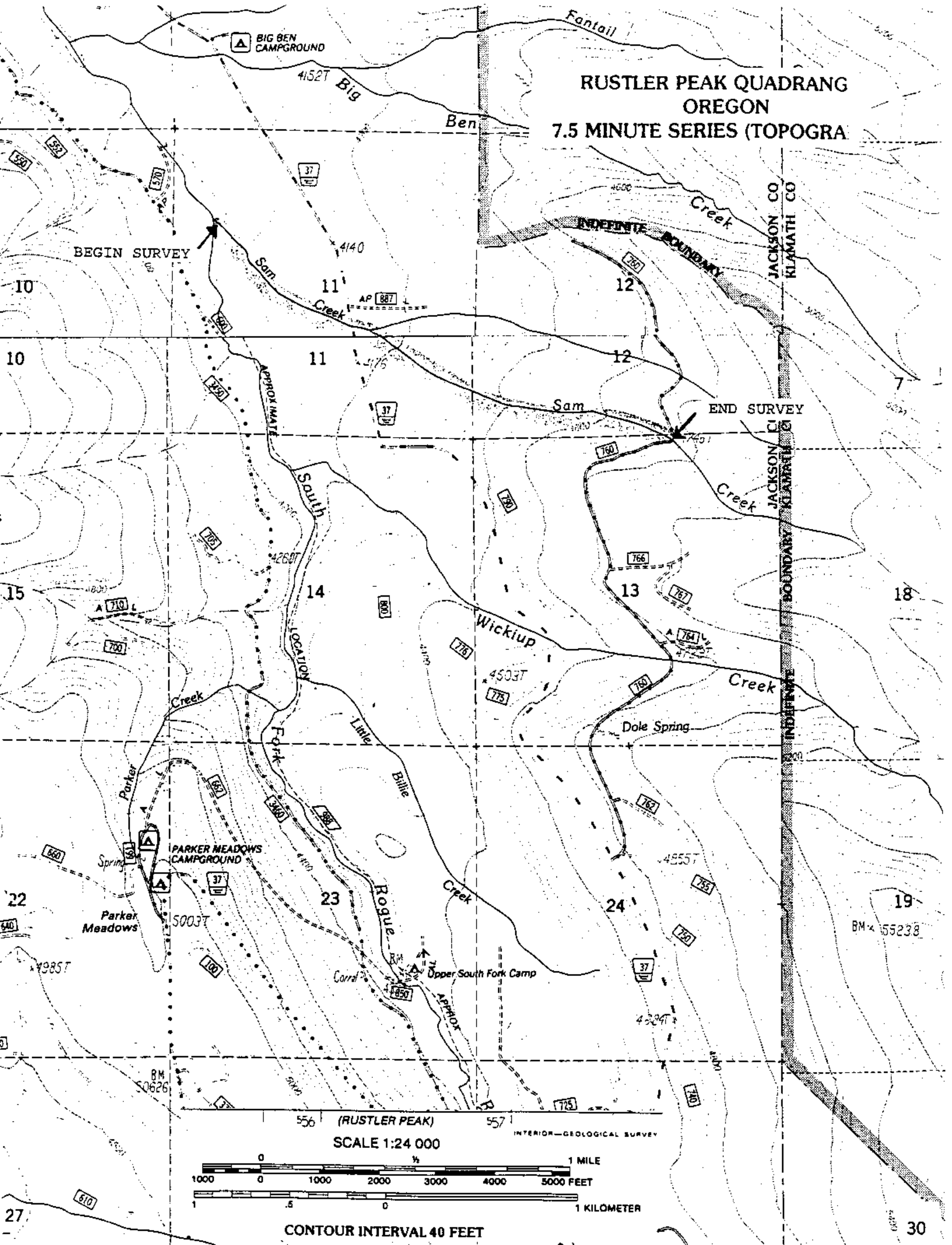
Substrate: gravel and cobble dominated this reach, good spawning gravels throughout this reach (see Figure 11b)

Wood: slash and small-medium class wood played a major role in the retention of substrate in this stream.

Pools: there were 5.75 pools per mile in this reach with five actual pools. Some pools because of classification standards were lumped into riffles.

Riparian: inner riparian consisted of 39% sapling pole size spruce and alder; and 61% large yew and douglas fir trees. The outer riparian was 100% large spruce.

Fish: electoshocking occurred below Road 760 and no fish were observed, ODFW guessed that the 760 Road was the upper limit to fish. Our shocking suggests that it may be a fair distance below the culvert.


RUSTLER PEAK QUADRANG
OREGON
7.5 MINUTE SERIES (TOPOGRA
BIG BEN CAMPGROUND
Fantail
Big Ben
BEGIN SURVEY
END SURVEY
Sam Creek
South Fork Rogue
APPROXIMATE LOCATION
Little Billie Creek
Wickiup Creek
Parker Creek
PARKER MEADOWS CAMPGROUND
Parker Meadows
Spring
Dole Spring
Upper South Fork Camp
Corral
INDEFINITE BOUNDARY
JACKSON CO
KLAMATH CO
(RUSTLER PEAK)
INTERIOR—GEOLOGICAL SURVEY
SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 FEET
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 40 FEET

**Basin Summary**

*Wickiup Creek*

Wickiup Creek apparently was effected by the floods of January 1997, lots of freshly scoured cobble areas and boulders, new erosional sites were also found. The Culvert at Road 37-760 was partially washed out. In 1980, ODFW also stated that there was evidence of high spring runoff or flooding regularly occurring. Wickiup creek is said to have been named by Lee Edmondson, a Butte Falls area trapper, after a major creek in the Wallowa Mountains of Northeastern Oregon in which he had trapped earlier. "Wickiup" refers to a temporary, mat or brush covered shelter used by Native Americans. Wickiup Creek can be accessed where it crosses Roads 800 and Road 37 and Road 37-760, and by foot on the South Fork of the Rogue River trail. On July 31,1997 the flow was taken 150' from the mouth on the South Fork of the Rogue river, approximately 0.38 cfs. On August 27, 1980 ODFW estimated the cfs as 1.0 cfs.

Wickiup Creek is in the High Cascades, the stream survey ranges from 4200 ft to 4800 ft. The stream flows out of the Sky Lakes Wilderness Area. Soil typing indicates that the parent material for this area is compacted glacial till. The upper most reaches of this stream in the Wilderness Area are described as broad gently sloping glaciated basins and scoured land. According to the soil resource inventory of the Rogue River National Forest the reach of land between Road 37 and 760 is permanent wetland. No mention however about this by the observers for this stream survey.

ODFW completed a fish inventory of this stream in August of 1980. The only fish species they electro fished up was rainbow trout., Our electrofishing also only shocked up rainbow trout. USFS crew only shocked at Road 760, while the ODFW crew shocked at both 37 and 760. The creek receives some fishing pressure near Road 37 but very little higher up. And according to the ODFW report fish size distribution was much better at the upstream site, the largest fish was electrofished up at the upper site 17 cm.

**Reach Summaries**

**Reach I**

This reach begins at the mouth on the South Fork of the Rogue River and ends at the Road 37 crossing, approximately 1.09 miles. The stream is also crossed near its mouth by the scenic South Fork of the Rogue River Trail. There is significant evidence of high waters eroding this stream. Larger substrate with little, if any, algal growth or moss above waterline, suggests considerable scour. Above Road 800 there is a large harvest unit with only a 75' buffer.

Substrate: much of the stream is dominated by larger substrates, high waters have flushed fine sediments.

Wood: there is very little wood in this stream, approximately 50 pieces of woody debris per mile the bulk of which is small and slash.

Pools: 16.5 pools per mile were recorded for Reach I. (18 observed pools). Some pocket pools were lumped with riffles because of classification limitations.

Riparian: inner riparian zone consisted of 4% sapling pole, 64% small tree, and 32% large trees. Most of which consisted of spruce and Big leaf maple. Outer riparian was 21% small tree and 79% large tree consisting of mostly Douglas fir and spruce.

Fish: Fish were visually observed throughout the reach and in 1980 the ODFW Electoshocked only rainbows. Some fishing pressure is expected in this area.

## Reach II

This reach begins at Road 37 and continues up approximately 0.71 miles just past Road 760 crossing. The surveyors notes of this reach stated that it "is characterized by very steep gradient, big boulders, pocket and plunge pools, fish present throughout stream". At Road 37 there is a heavy willow and alder over story. The stream goes subsurface in one habitat unit fish are present on either side of the dry channel.

Substrate: larger substrates are favored in this section due to the high gradient and high flows in the spring time and winter high flows such as the high flow event of January 1997.

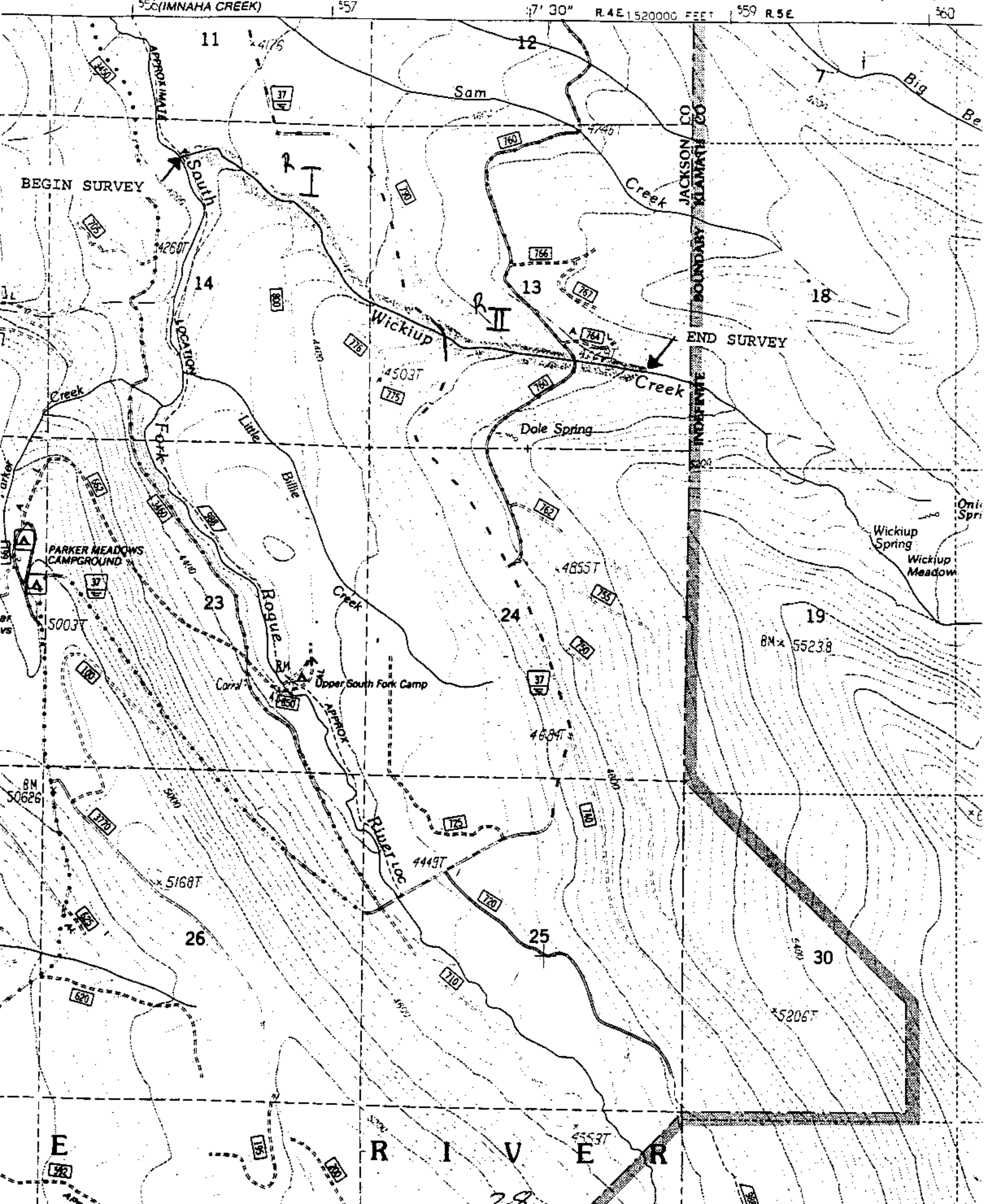
Wood: This high gradient reach of stream has a difficult time retaining wood during periods of high water. There was only 16.9 pieces of large woody debris/mile in this stream most of which is small size class.

Pools: pools per mile in this reach numbered approximately 16.9 (12 observed pools). Plunge pools and pocket pools make up the bulk of the pools observed, many pools however were lumped with riffles due to classification protocol.

Riparian: the inner riparian zone was composed of willow alder and spruce 28%of which were sapling pole size class, 69% small tree and 3% large tree. The outer riparian was composed of large tree class douglas firs and spruces.

Fish: Four rainbow trout were electoshocked near the Road 760 culvert. ODFW commented that this section of stream has a healthy size class variance, probably due to lack of fishing pressure. They caught all rainbows as well sizes ranging up to 17 cm.

# RUSTLER PEAK QUADRANGLE
# OREGON
# 7.5 MINUTE SERIES (TOPOGRAPHIC)



## FISH PRESENCE AND HABITAT EVALUATION

**Frey Creek-** located at culvert on Hwy 37

- fish species: none
- amphibians: none
- riparian condition: healthy
- log presence: some woody debris
- substrate: slightly embedded gravel
- channel type: several riffles, very few pools
- water temperature: 44^

**Fantail Creek-** located at culvert on Hwy 37

- fish species: 1 Brook Trout, approximately 2 ½ inches
- amphibians: none
- riparian condition: healthy
- log presence: some woody debris
- substrate: gravel, silt, cobble
- channel type: riffles and plunge pools
- water temperature: 46^ F

**Sumpter Tributaries-** located on road 200

- fish species: 2 Brooke Trout, approximately 2 ½ inches
- amphibians: none
- riparian condition: logging activity within last 20 years
- log presence: lots of woody debris
- substrate: gravel and silt
- channel type: intermittent riffles and pools, recently braided
- water temperature: 48^ F
- comments: downstream tributary no fish, upstream tributary 2 fish

**Nichols Creek-** located on road 3775050, Nichols campground

- fish species: 1 Cutthroat, approx. 5 inches
- 3 Brooke Trout, approx. 2 in., 4 in., and 6 inches
- 1 unknown trout, approx. 1 inch
- amphibians: unidentified frog species
- riparian condition: healthy, abundant swamp/marsh plants, no signs of cattle damage
- log presence: lots of small woody debris and slash
- substrate: mostly sand/ soft sediment
- channel type: deep and narrow with many pools
- water temperature: 47^F
- date evaluation performed: July 2, 1997

## FISH PRESENCE EVALUATIONS

**Sam Creek-** located below culvert on road 760

- habitat description: subsurface flow below culvert, flow returns approx. 50 feet
  stream is dry above culvert, possibly subsurface flow
- fish presence: none
- date of fish presence evaluation: July 31, 1997

**Wickiup Creek-** located above and below culvert on road 760

- habitat description: culvert partially torn out/ road washed out
  stream cascade, cobble/boulder substrate
- fish presence below culvert: 4 Rainbow Trout (native)
  2 approx. 6 in.
  1 approx. 3 in.
  1 unknown size
- fish presence above culvert: 2 unidentified fish
- date of fish presence evaluation: July 31, 1997

**Spring Creek-** fish presence evaluation performed on July 2, 1997 and July 14, 1997

- culvert on road 567: below culvert, 1 Rainbow Trout, approx. 3-4 inches
  above culvert, 4 Brook Trout from approx. 2-4.5 inches
- culvert on road 37: below culvert, 1 Brook Trout, approx. 3 inches
  above culvert, no fish found
- culvert on road 930: above and below culvert, no fish found

**Whitman Creek-** fish presence evaluation performed on July 10, 1997

- culvert on road 37: below culvert in pool, Brook Trout, approx. 6.5 inches
  above culvert to 100 yards, no fish found
- culvert on road 230: dry channel

**North Fork Wallowa Creek-** located downstream of road 200

- fish presence: none
- habitat description: much of creek is dry channel, mostly sub-surface flow
- date of fish presence evaluation: July 10, 1997

**South Fork Wallowa Creek-**fish presence performed July 10, 1997 & July 14, 1997

- road 930: near confluence of South Fork and North Fork, observed in 1 pool
  1 Brook Trout, approx. 6 inches
- below culvert on road 200: stream cascade
  2 unidentified fish, possibly Brook Trout
  1 Asaphus truei larvae (Tailed frog)
- road 3785: gradient too steep to support fish

**North Fork Sumpter Creek-** located on road 200 between spur roads 270 and 280
- fish presence: none
- date of fish presence evaluation: July 21, 1997

**Middle Fork Sumpter Creek-** located on road 200 between spur roads 252 and 260
- fish presence: none
- date of fish presence evaluation: July 21, 1997

**Sumpter Creek-** fish presence evaluation performed on July 21, 1997 and July 30, 1997
- culvert on road 37: below culvert, 1 Rainbow Trout, approx. 7 inches
  above culvert 200 yards upstream in pool, 4 Brook Trout
- culvert on road 200: cattle grazing in riparian
  below culvert, 1 Brook Trout, approx. 6 inches
  above culvert, 1 unidentified fish, possible Rainbow
- below culvert on road 3780500: no fish
  stream braided/ marshland

# APPENDIX I
# HYDROLOGY - AQUATIC SYSTEMS

# Forks Watershed Analysis

## Hydrology

# HYDROLOGY

Climate:

The climate of the area is characterized by cool moist winters and warm dry summers. This pattern can be seen in Figure A. which shows the 30-year precipitation and temperature averages for Prospect, which is north and west of the watershed. During the winter months that general southward displacement of the Aleutian low pressure system results in a predominant westerly flow of moist air from the Pacific Ocean. The area is subject to frequent winter storms of varied intensities. Winter precipitation in the higher elevations generally occurs as snow, with rain occurring in the lower elevations. During summer months, the area is dominated by the Pacific high pressure system which produces hot, dry summers. Summer rainstorms occur occasionally and are usually of short duration and limited areal coverage. Annual average precipitation varies by location within the watershed. Expected annual precipitation varies between 45 and 65 inches. Most of this occurs during the months of October to March. Figure B. depicts average annual precipitation within the analysis area. Figure C. shows how this amount of precipitation relates to the state of Oregon.

## Hydrology

There are records from seven different U.S. Geological Survey stream gaging stations within the Forks analysis area. Only one of these, South Fork Rogue River near Prospect, is currently operating. The rest have been discontinued. Table A shows runoff information from these stations.

Runoff is a response to precipitation. In this area, runoff does not parallel precipitation patterns. Whereas precipitation peaks during the months of November to January, runoff peaks in March to June in response to snowmelt from the higher elevations. Runoff rises in the fall in response to the annual increase in precipitation. As the precipitation changes to snow during the winter months, runoff levels off. The annual peak in runoff occurs in late spring as the snowpack begins to melt. Once the snow is gone, runoff drops off to the levels experienced in the summer when streamflows are normally at their lowest. Figure D. depicts the precipitation-runoff relationship for the analysis area. Figure E. shows monthly discharge for four streams within the analysis area. Although the scale is different for each of the stations, the pattern of runoff is similar.

Although the annual runoff peak generally occurs in late spring in response to snowmelt, the record peak flow occurred in December 1964 in response to a rain-on-snow event. The estimated peak flow in the South Fork Rogue in 1964 was 28,500 $ft^3$/sec. This compares to the average flow of 404 $ft^3$/sec. On an annual basis, the study area yields about 293,000 acre-feet of water each year.
There are two primary diversions of water within the analysis area; one from the South Fork and one from the Middle Fork. Both of these are for generation of power at the pacific Power plant on the Rogue below Prospect. Water diverted from the two forks is carried by canal into a forebay on the main Rogue just below the Prospect Ranger Station. From there water is diverted into a canal and penstock through the power plant and back into the Rogue.

## Lakes

In the headwaters of the analysis area are a number of small lakes. The lakes are in the Sky Lakes Wilderness and are of glacial origin. Studies into the water quality of these lakes has been ongoing for several years. The lakes are of uniformally high quality. Several have caught the attention of researchers due to their exceptional quality. Alta Lake stands out among these due to its chemical purity and low buffering capacity. It is most "rain water-like" in quality.

The investigations into the quality of these lakes have produced volumes of information. The studies have shown all of the lakes ecologically to be classified as wither ultra oligotrophic or oligotrophic. Lakes thus classified are very low in nutrients and support lower levels of life than those that are relatively richer in nutrients. In a natural progression in the life of a lake, it would start at oligotrophic and progress to mesotrophic as it gained in nutrients from runoff and rainfall. Then it would progress to eutrophic and finally turn into a meadow. Eutrophic lakes have high nutrient levels and abundant plant life.

Within Sky Lakes Wilderness, there are no lakes classified as eutrophic, but there are some that are mesotrophic. There is also at least one which has progressed through eutrophic conditions and is fast becoming a meadow. That lake is Meadow Lake in the Blue Canyon Basin of the South Fork of the Rogue River.

The chemical and physical properties of the lakes has been well-documented by Salinas. Readers interested in these properties are referred to his reports.

## Water Quality

The identified beneficial uses for water within the analysis area are stockwatering, hydropower, aesthetics, water-based recreation, and coldwater fishery. The Oregon Department of Environmental Quality, during the 1994-1996 water quality assessment as required by the Federal Clean Water Act, found no streams within the watershed analysis area to be "water quality limited". Water quality within the analysis area is generally very high.

The dominant use for the land within the analysis area has been timber harvest. This land-disturbing activity has the most potential to impact stream temperatures and erosion/sedimentation. There is little information on erosion rates within the watershed. There are areas of instability that have the potential to add large quantities of sediment into streams. These are discussed in the soils and geology sections of this report. They are generally thought to present little problem for water quality.

Stream temperature is the parameter most likely to be affected by land management activities within the analysis area. Stream within the watershed are naturally cool and clear. There are two primary reasons for this -- streams have large contributions of cold groundwater in many locations, and they have had the protective cover of dense riparian vegetation to keep them shaded. Monitoring in recent years has documented that stream temperatures are generally very good. Figures F-I. show stream temperatures for four streams during recent years. The 1994 water year was one of record low flows in streams throughout southwestern Oregon. Water temperatures in 1994 are representative of worst case conditions. For the streams monitored, none exceeded the Oregon water quality standard for summer temperature.

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## AQUATIC SYSTEMS

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USDA, Forest Service. 1995. Wilfire and salvage logging. unpublished document. Region 6 Office, Portland, Oregon.

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# Forks Watershed Analysis

## Hydrologic Information

- ➔ Water chemistry, phytoplankton, zooplankton data on the following lakes in Sky Lakes Wilderness
    - * Alta - two years: 1993, 1994
    - * Cliff: 1993
    - * Middle: 1993
    - * Blue: 1993
    - * Carey: 1994
    - * Holst: 1994
    - * Hemlock: 1994
    - * Finch: 1994
    - * Grass: 1996*
    - * Ivern: 1996*
    - * Middle: 1996*

        **Samples collected in summer 1996, report ready in May 1997.*
- ➔ Stream Temperature Data
    - * South Fork Rogue below Imnaha Creek: 1993 - 1996
    - * Imnaha Creek: 1993 - 1995
    - * Big Ben Creek: 1996
    - * Red Blanket Creek: 1996
    - * South Fork Rogue south of Prospect: 1968 - 1992
- ➔ Sediment Data on South Fork Rogue south of Prospect: 1976 - 1981
- ➔ Streamflow Data
    - * South Fork Rogue south of Prospect: 1968 - 1992
    - * South Fork Rogue and Power Canal near Prospect: 1924 - 1983
    - * Imnaha Creek: 1933 - 1949
    - * South Fork Rogue near Prospect: 1967 - 1995
    - * South Fork Rogue above Imnaha Creek: 1931 - 1949
    - * Middle Fork Rogue near Prospect: 1925 - 1955
    - * Red Blanket Creek: 1925 - 1981

# 30 Year Daily Averages At Prospect

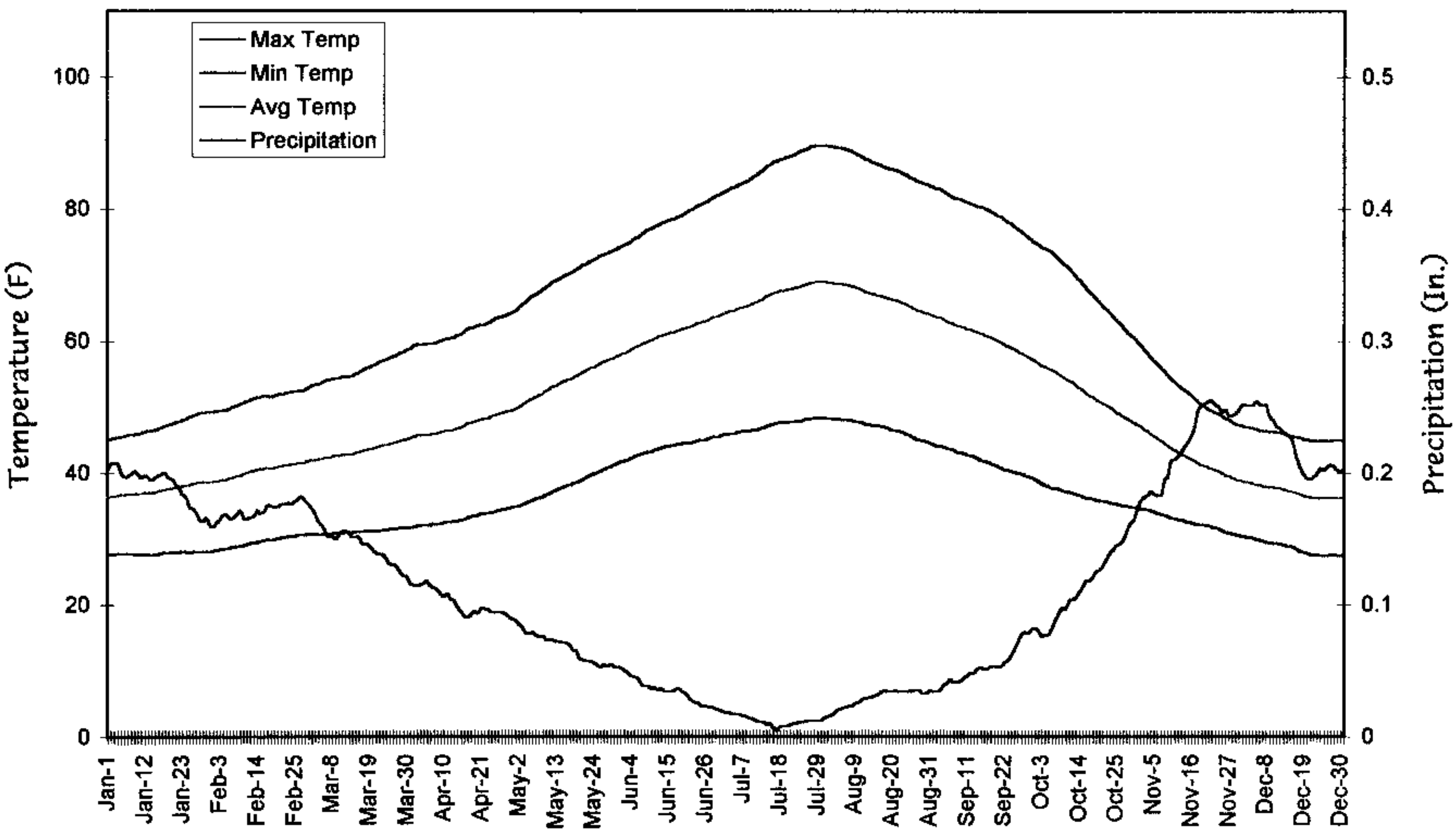
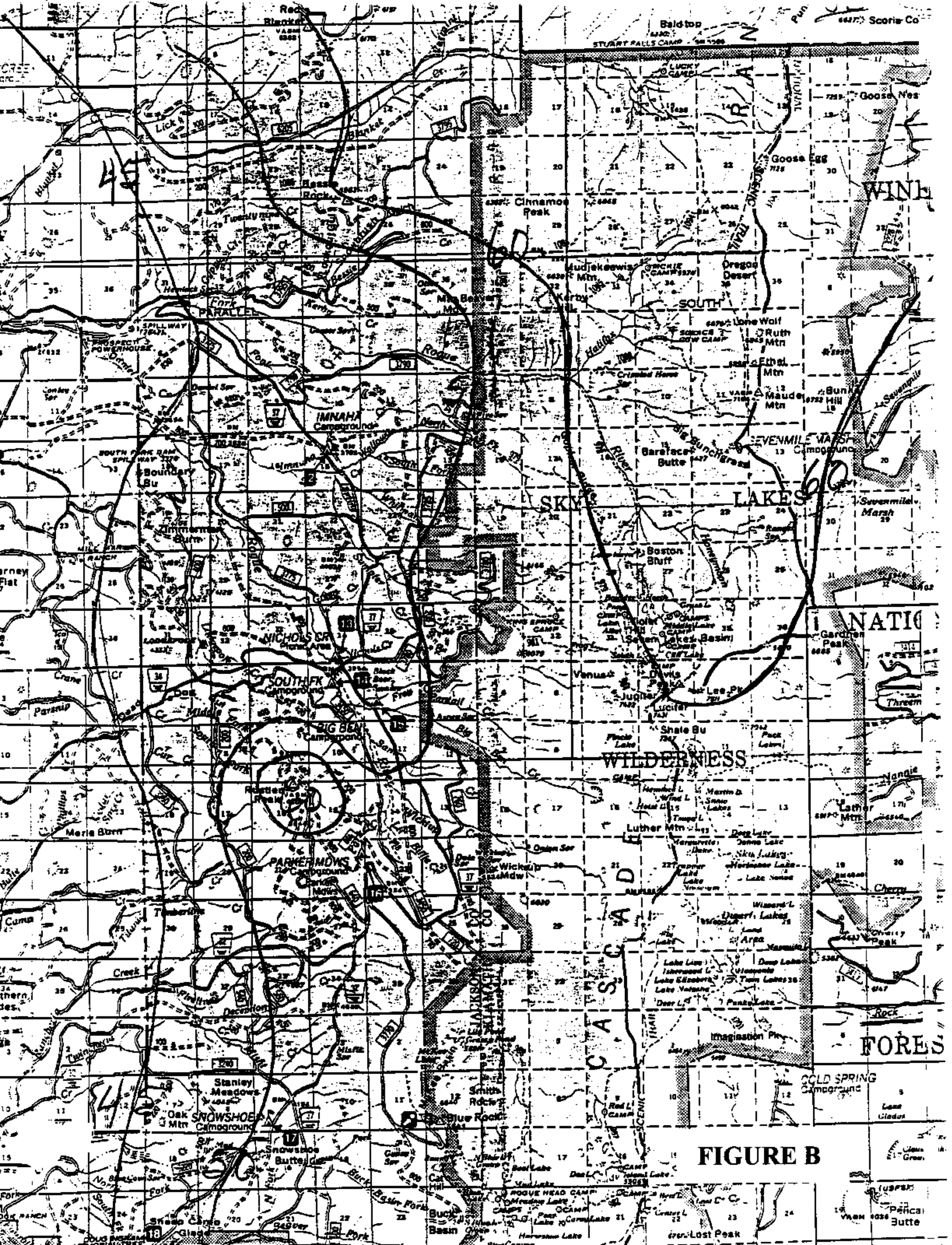
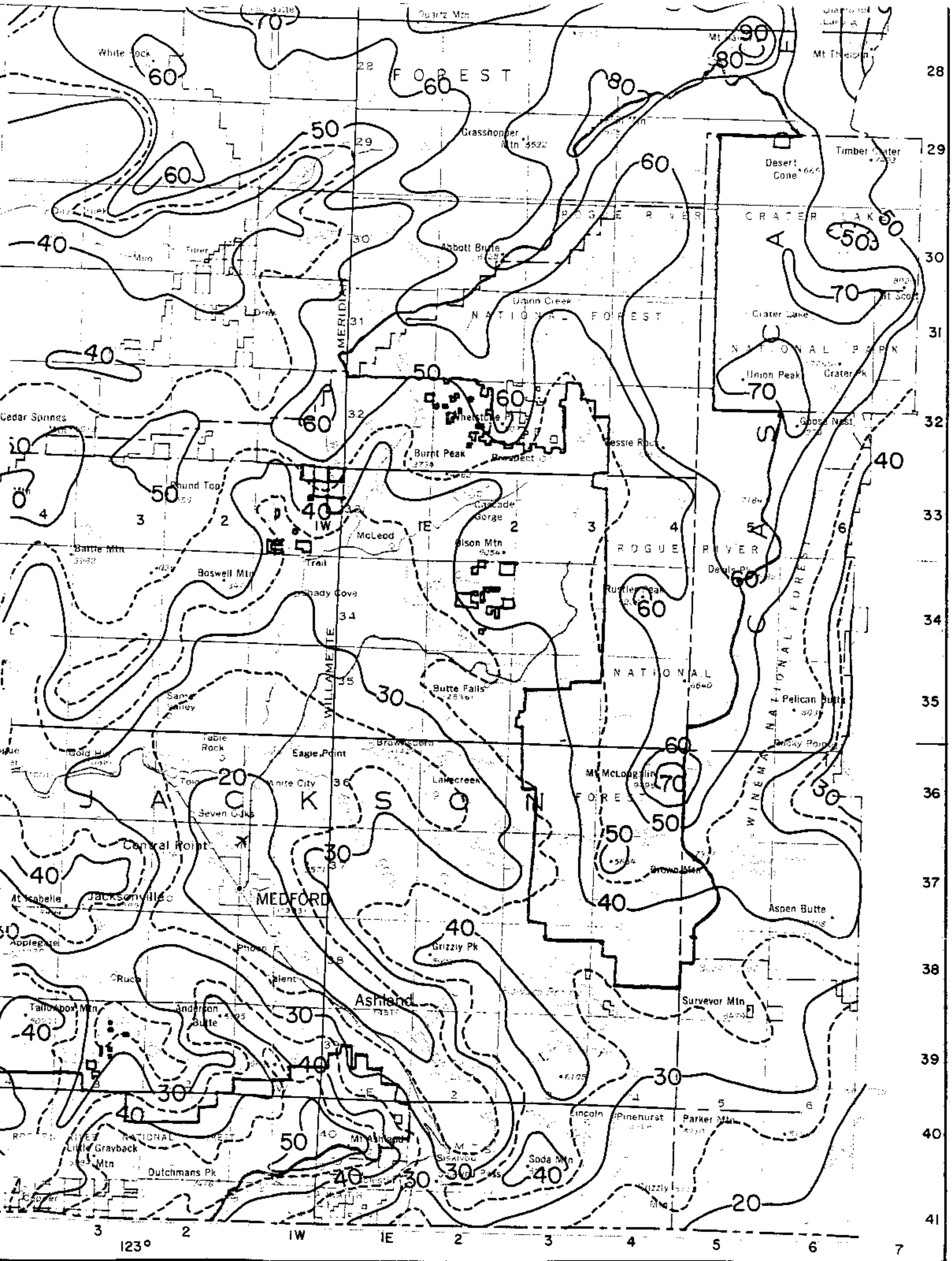



**FIGURE A**

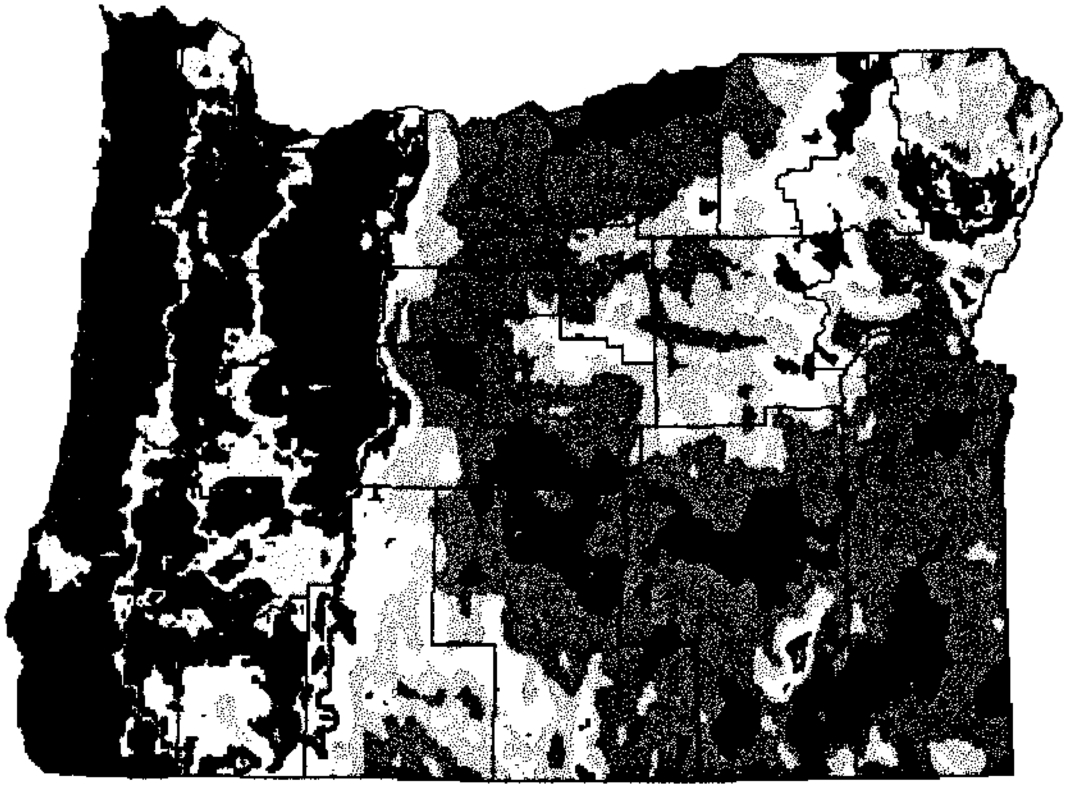


Baldtop
STUART FALLS CAMP
LUCKY CAMP
Goose Nest
Goose Egg
WINE
Cinnamon Peak
Mudjekeewis Mtn
Oregon Desert
SOUTH
Kerby Hill
Miss Beaver Mdw
Lone Wolf
Ruth Mtn
Ethel Mtn
Maude Mtn
Bunk Hill
SEVENMILE MARSH Campground
Sevenmile Marsh
Big Bunchgrass
Barefaced Butte
SKY
LAKES
Boston Bluff
IMNAHA Campground
Rogue
Boundary Bu
Zimmerman Burn
PARALLEL
NICHOLS CR Picnic Area
SOUTH FK Campground
BIG BEND Campground
Rustler Peak
PARKER MDWS Campground
Parker Mdws
Wickiup Mdw
Merle Burn
Venus
Jupiter
Devils Peak
Lee Pk
Lucifer
Shale Bu
WILDERNESS
Luther Mtn
Lather Mtn
Gardner Peak
NATI
Cherry Peak
Rock
FORES
Imagination Pk
COLD SPRING Campground
Smith Rock
Blue Rock
Stanley Meadows
Oak Mtn
SNOWSHOE Campground
Snowshoe Butte
Cat Hill
Buck Basin
Sheep Camp
Glade
ROGUE HEAD CAMP
Lost Peak
Pelican Butte
JACKSON
KLAMATH
CASCADE
SCENIC
TRAIL


FIGURE B



FOREST
White Rock
Quartz Mtn
Mt Thielsen
Grasshopper Mtn
Desert Cone
Timber Crater
ROGUE RIVER
CRATER LAKE
Abbott Butte
Union Creek
NATIONAL FOREST
Crater Lake
NATIONAL PARK
Union Peak
Crater Pk
Goose Nest
Mt Scott
MERIDIAN
WILLAMETTE
Cedar Springs
Round Top
Burnt Peak
Prospect
Jessie Rock
Cascade Gorge
McLeod
Trail
Battle Mtn
Boswell Mtn
Olson Mtn
Shady Cove
Rustler Peak
Devils Pk
NATIONAL
Butte Falls
Sams Valley
Pelican Butte
Table Rock
Eagle Point
Brownsboro
Lakecreek
Gold Hill
Rocky Point
White City
Mt McLoughlin
JACKSON
Seven Oaks
FOREST
WINEMA NATIONAL FOREST
Central Point
Brown Mtn
Mt Isabelle
Jacksonville
MEDFORD
Aspen Butte
Applegate
Grizzly Pk
Phoenix
Talent
Ruch
Ashland
Surveyor Mtn
Tallowbox Mtn
Anderson Butte
ROGUE RIVER NATIONAL FOREST
Lincoln
Pinehurst
Parker Mtn
Little Grayback Mtn
Mt Ashland
Siskiyou
Siskiyou Pass
Soda Mtn
Dutchmans Pk
Copper
Grizzly
123°
1W
1E
20
30
40
50
60
70
80
90
28
29
30
31
32
33
34
35
36
37
38
39
40
41



**Mean Annual Precipitation, 1961-1990**

State of Oregon

Oregon Climate Service
Corvallis, Oregon
George H. Taylor, State Climatologist

| Legend (inches per year) | |
|---|---|
| Less than 10 | 40 to 50 |
| 10 to 16 | 50 to 60 |
| 16 to 22 | 60 to 80 |
| 22 to 28 | 80 to 100 |
| 28 to 34 | 100 to 150 |
| 34 to 40 | More than 150 |



**FIGURE C**

| Station | Period of Record | Drainage Area - $Mi^2$ | Peak Flow - CFS | Minimum Flow - CFS | Average Flow - CFS | Average Annual Runoff - Ac.-Ft. |
|---|---|---|---|---|---|---|
| South Fork Rogue South of Prospect | 1968-1992 | 246.0 | 28,500 | 54 | 404 | 292,700 |
| South Fork Rogue and Power Canal | 1924-1983 | 83.8 | 4500 | 38 | 181.82 | 131,600 |
| Imnaha Creek | 1933-1949 | 26.0 | 500 | 11 | 42.8 | 31,150 |
| South Fork Rogue near Prospect | 1967-1995 | 83.8 | 7,010 | 38 | 178 | 129,000 |
| South Fork Rogue above Imnaha Cr. | 1931-1949 | 52.0 | 2,170 | 27 | 127 | 92,000 |
| Middle Fork Rogue near Prospect | 1925-1955 | 56.5 | 3,120 | 72 | 184 | 133,200 |
| Red Blanket Creek | 1925-1981 | 45.5 | 3,190 | 34 | 115 | 83,320 |

**TABLE A**

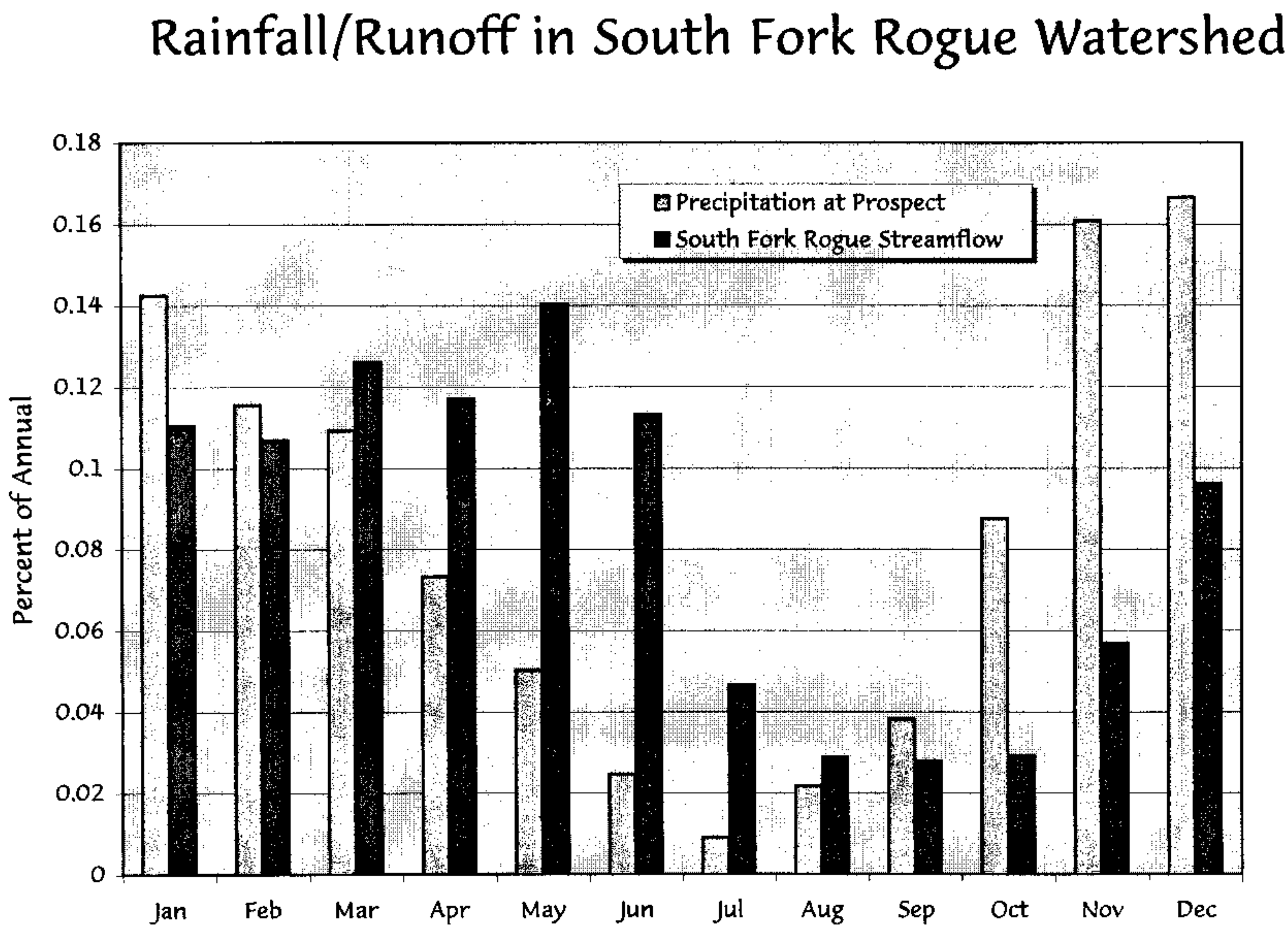
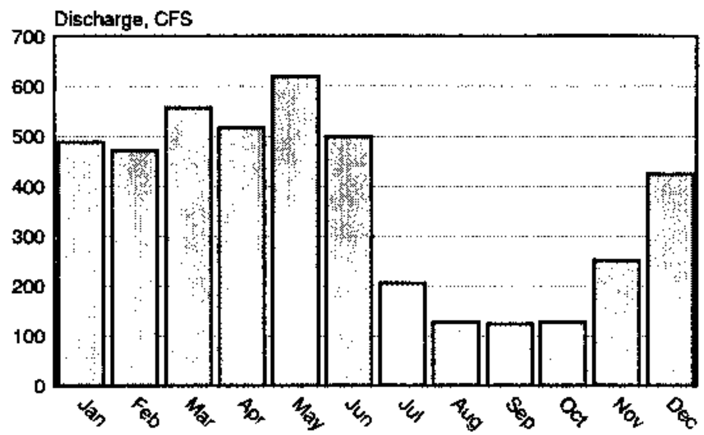

Rainfall/Runoff in South Fork Rogue Watershed
Precipitation at Prospect
South Fork Rogue Streamflow
Percent of Annual
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

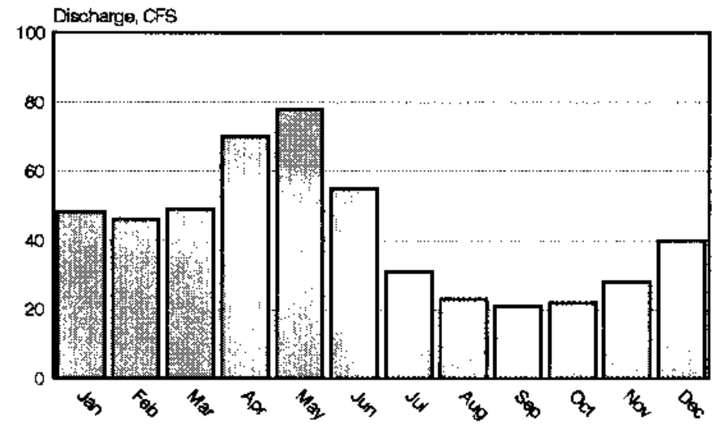
**FIGURE D**

# Forks Watershed Analysis

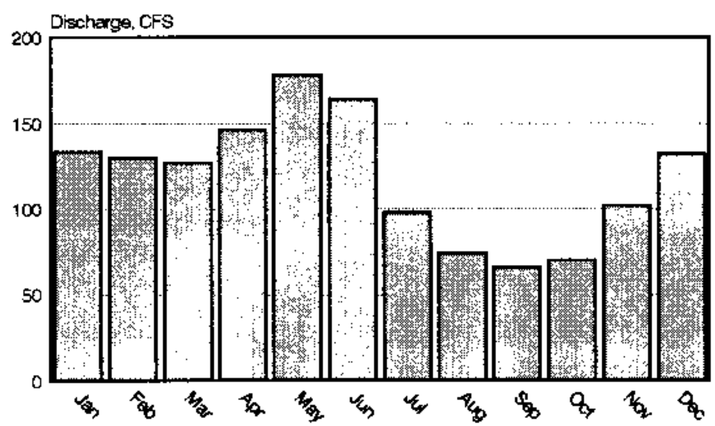
## Mean Monthly Discharge



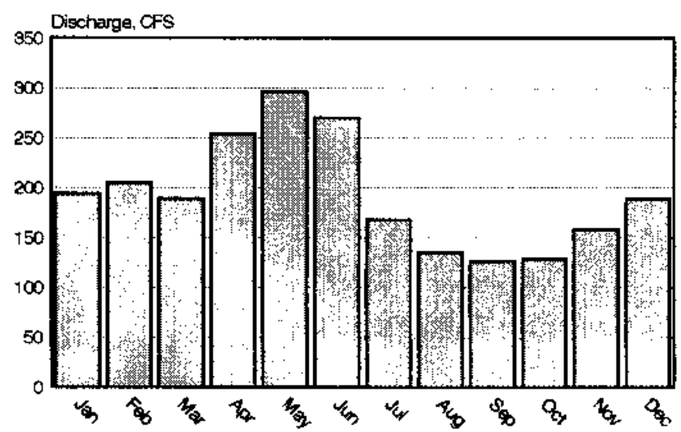

South Fork Rogue River South of Prospect




Imnaha Creek




Middle Fork Rogue River near Prospect




Red Blanket Creek

**FIGURE E**

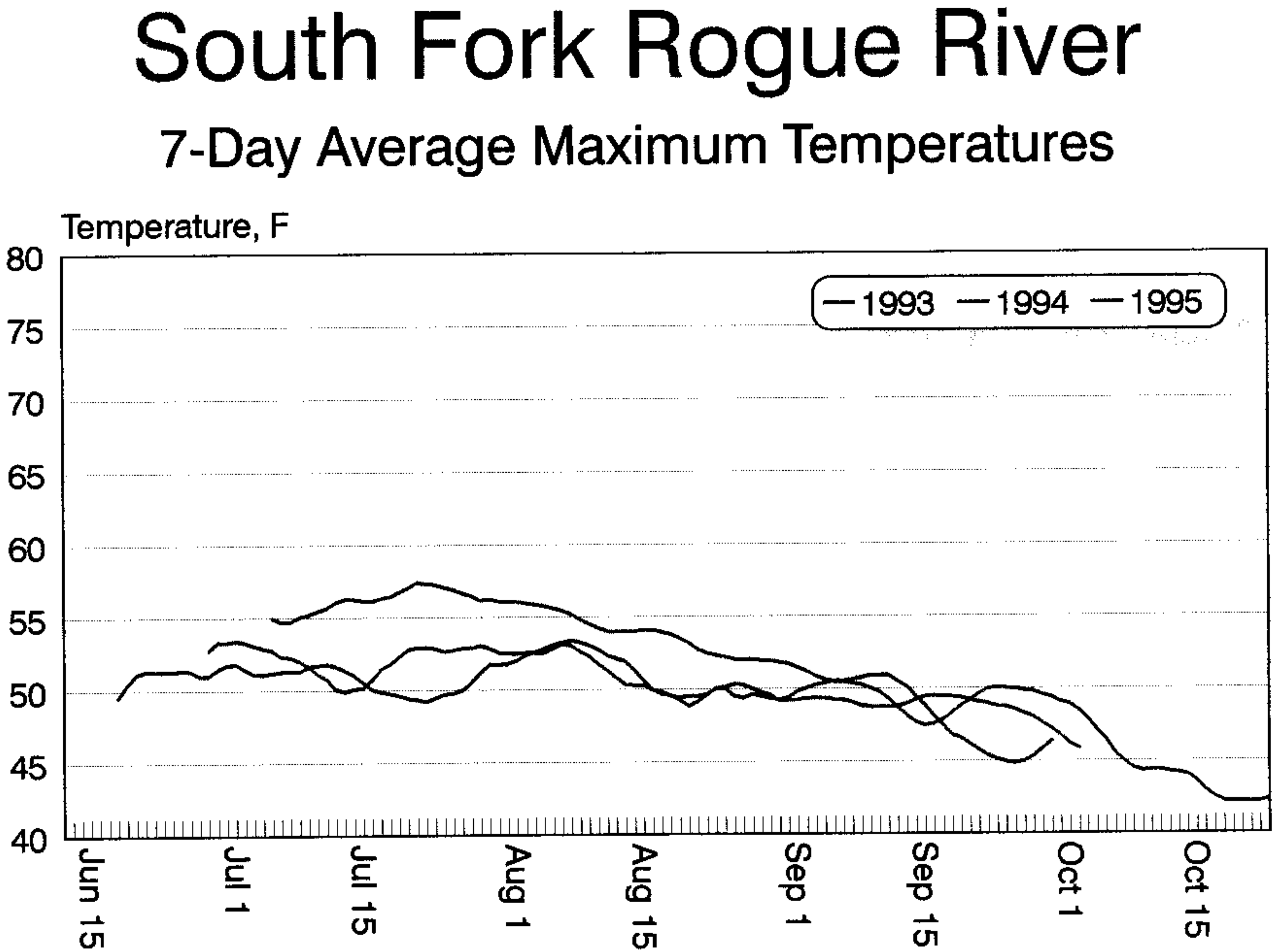

South Fork Rogue River
7-Day Average Maximum Temperatures
Temperature, F
80
75
70
65
60
55
50
45
40
1993
1994
1995
Jun 15
Jul 1
Jul 15
Aug 1
Aug 15
Sep 1
Sep 15
Oct 1
Oct 15

**FIGURE F**

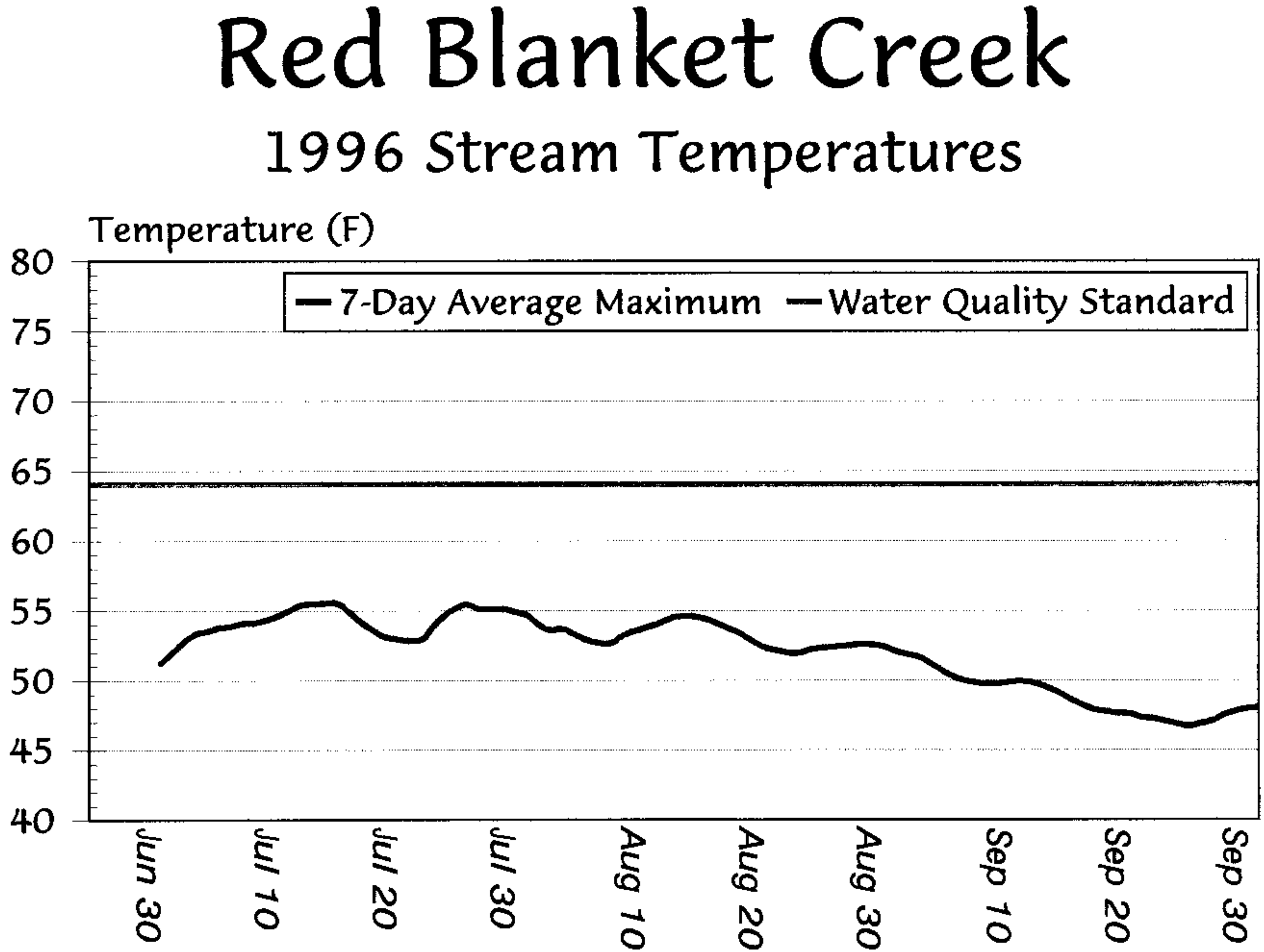

Red Blanket Creek
1996 Stream Temperatures
Temperature (F)
80
75
70
65
60
55
50
45
40
7-Day Average Maximum
Water Quality Standard
Jun 30
Jul 10
Jul 20
Jul 30
Aug 10
Aug 20
Aug 30
Sep 10
Sep 20
Sep 30

**FIGURE G**

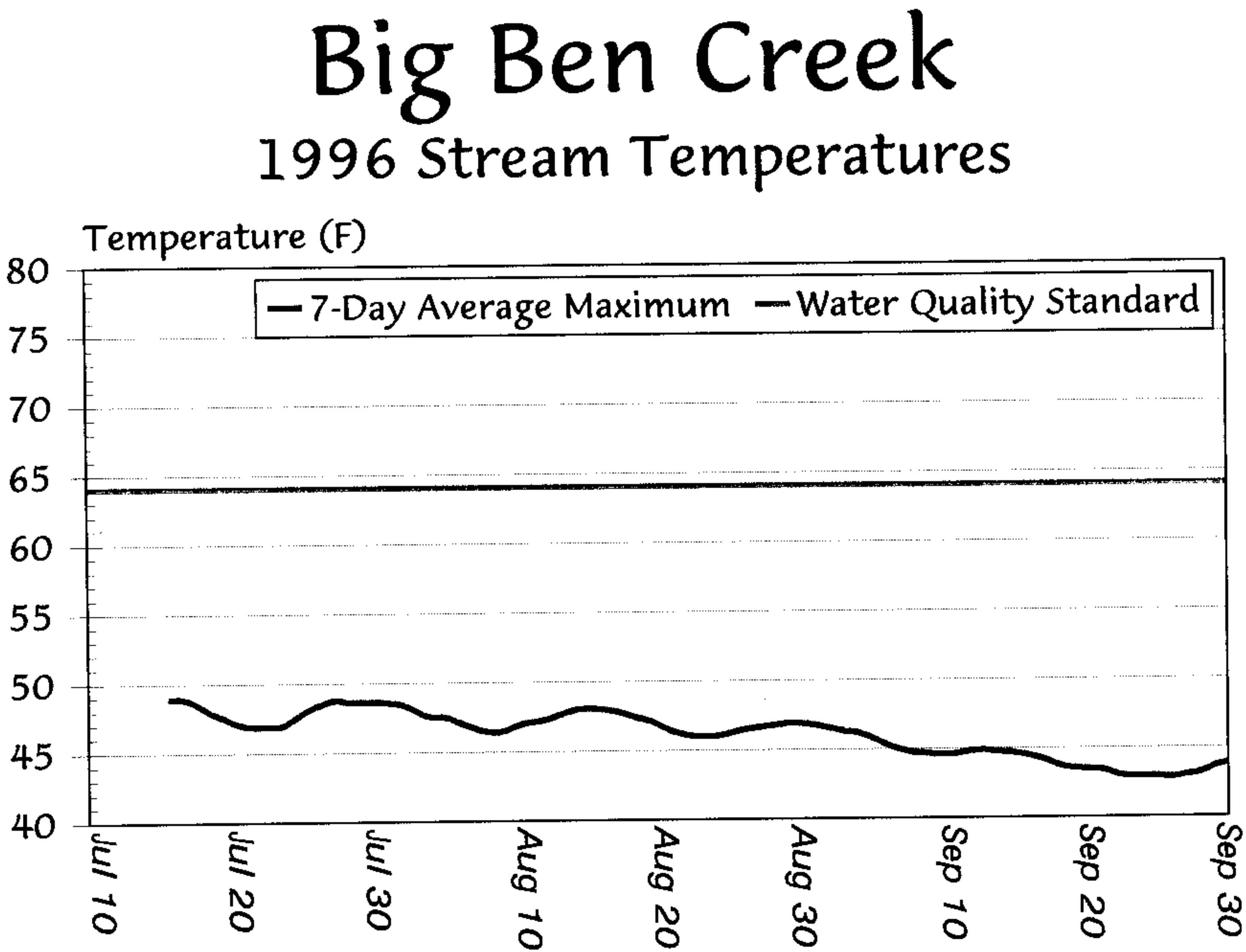

Big Ben Creek
1996 Stream Temperatures
Temperature (F)
80
75
70
65
60
55
50
45
40
7-Day Average Maximum
Water Quality Standard
Jul 10
Jul 20
Jul 30
Aug 10
Aug 20
Aug 30
Sep 10
Sep 20
Sep 30

**FIGURE H**

# Imnaha Creek

## 1995 7-day Average Maximum Temperature

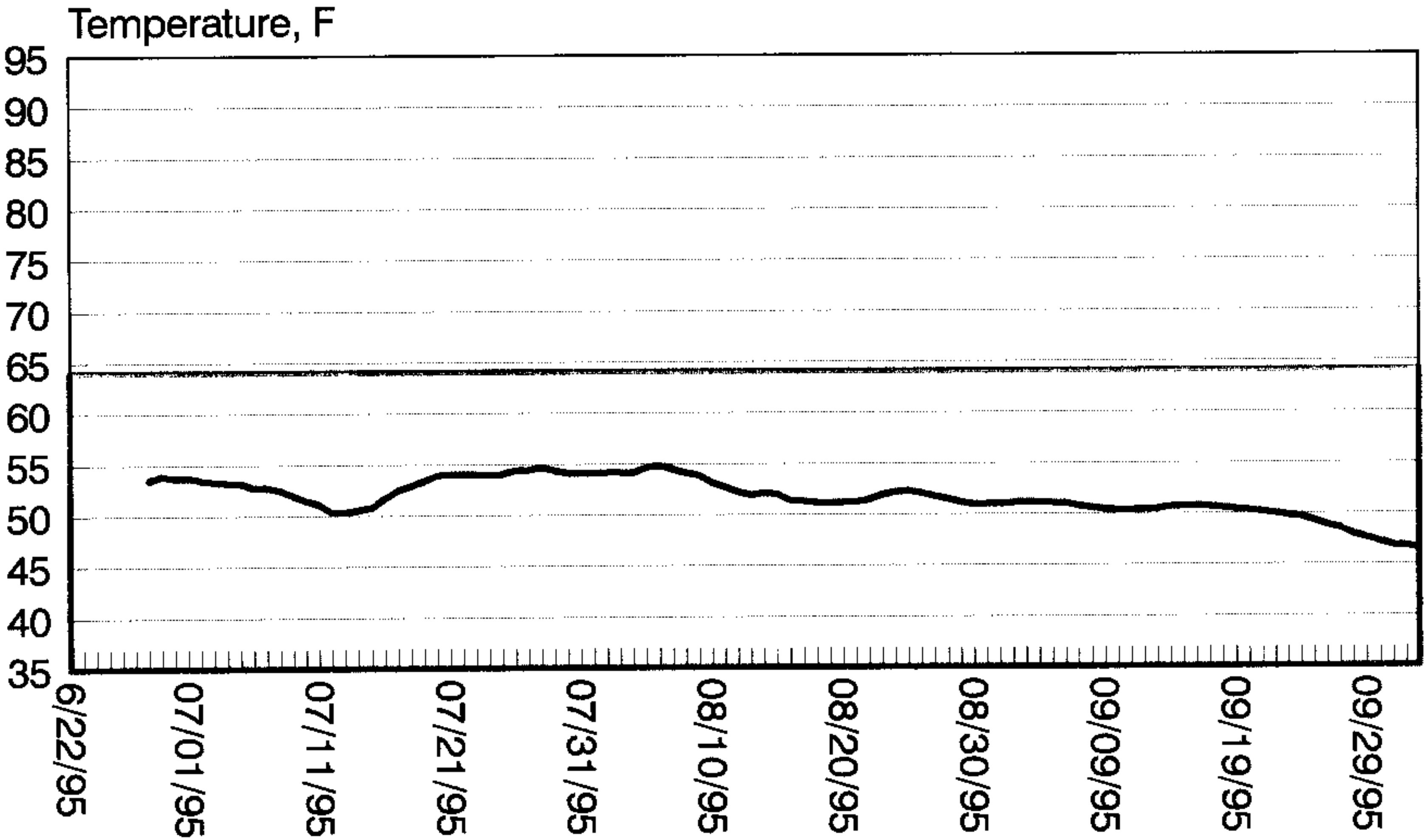


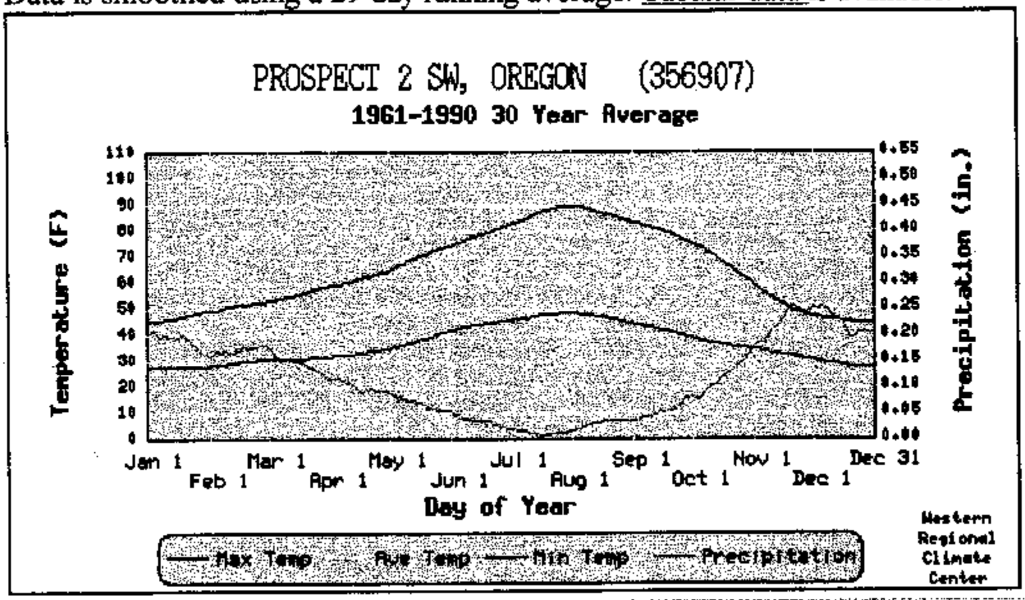

**FIGURE I**

# PROSPECT 2 SW, OREGON

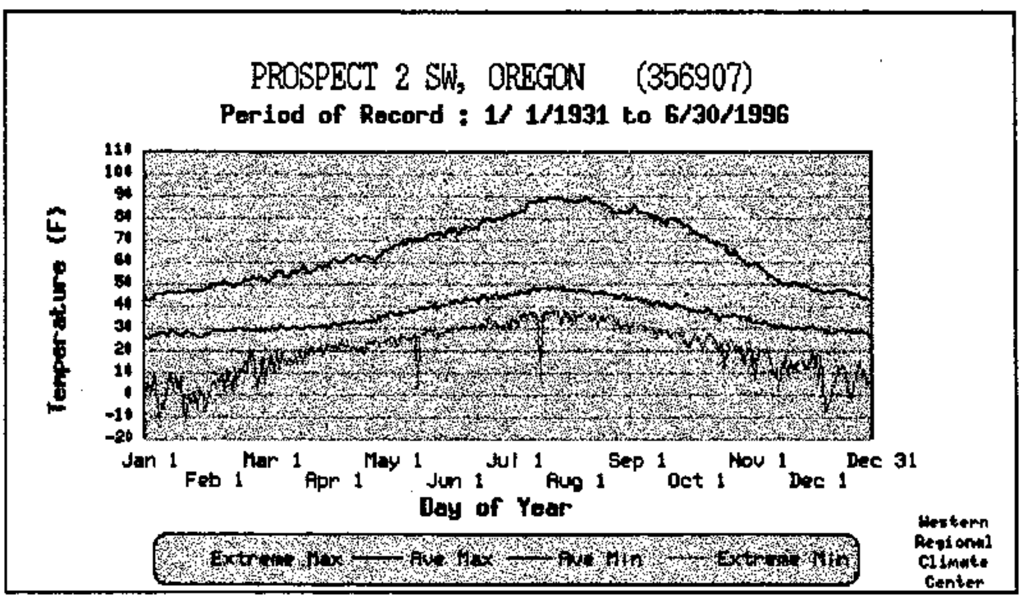
## Climate Summary

# 30 Year Daily Averages

Data is smoothed using a 29 day running average. Tabular data is available.




# Period of Record Daily Extremes and Averages

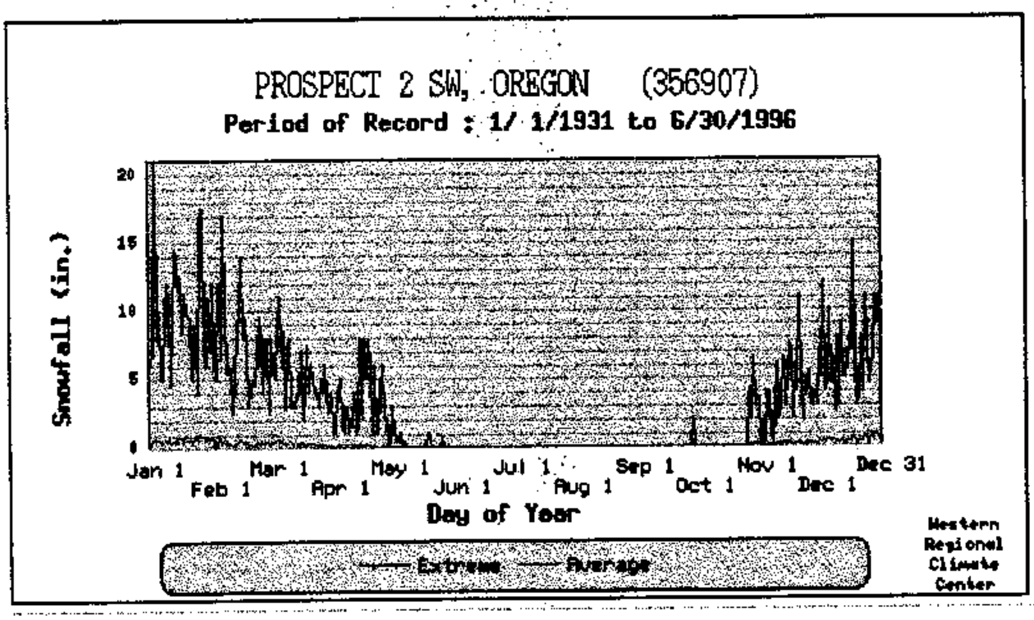



Temper.

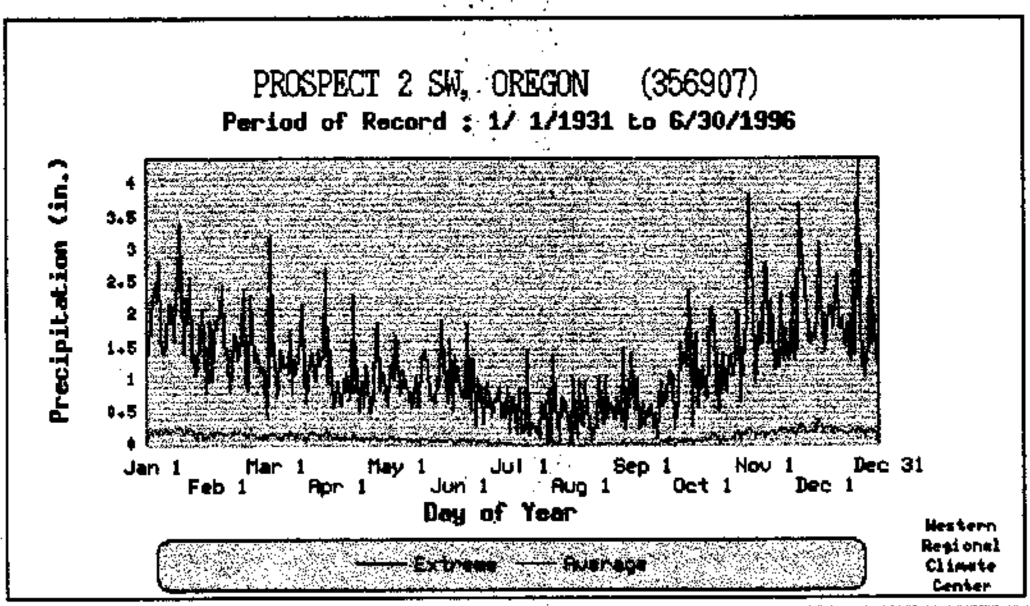
Precipitation

Average only precipitation graph.

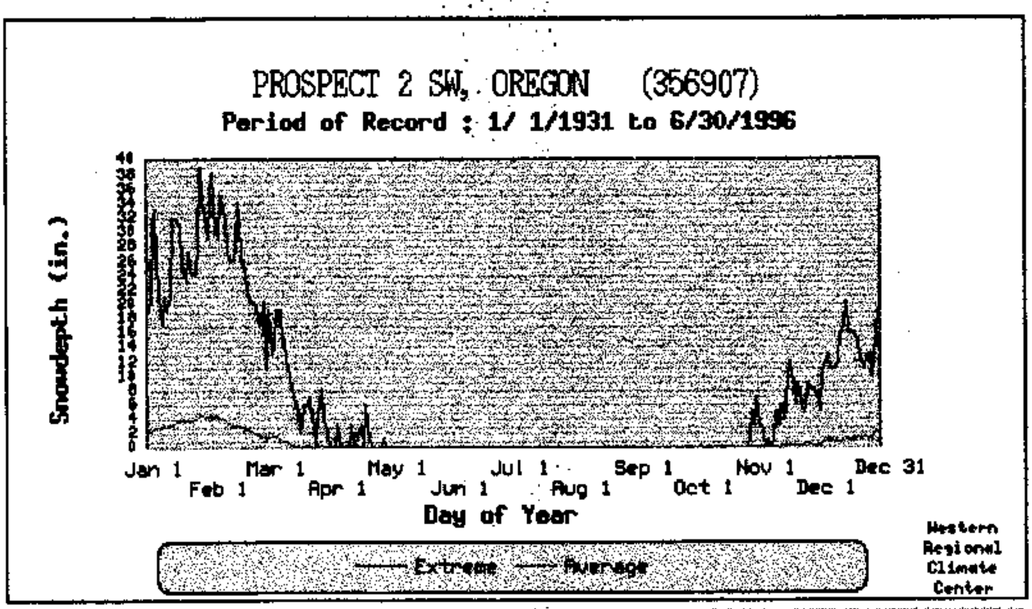
PROSPECT 2 SW, OREGON - Climate Summary - Microsoft Internet Explorer




Snowfa




Precipita

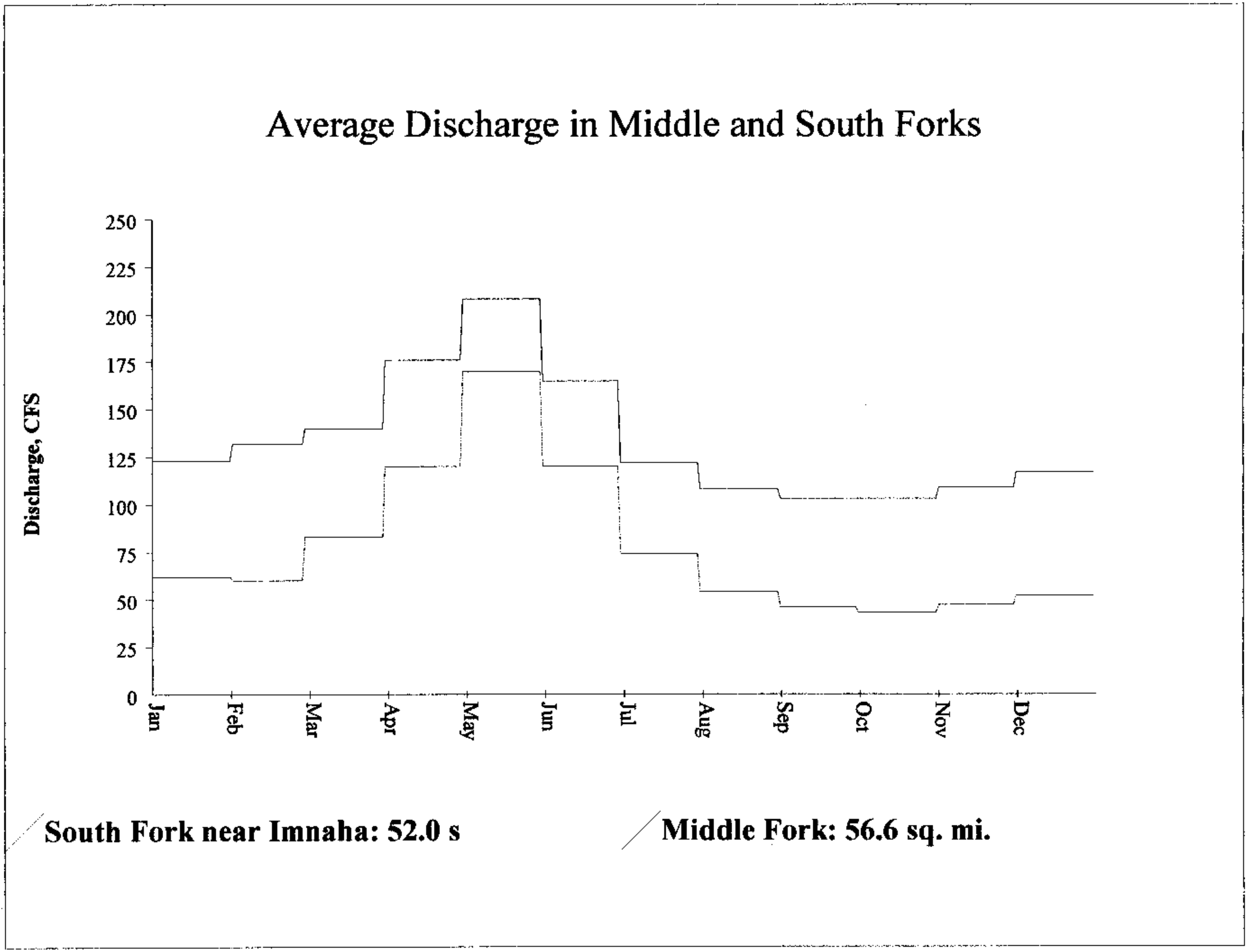



Snowd

## Rogue River Basin Temperature Study
## 1995

### Upper Rogue Subbasin
### 800,000 acres

| Site Name | Map I.D. | Agency | Max. 7-Day High (F) 1993 | 1994 | 1995 | 1995 Diurnal range on the warmest day of 7-day high. | Date of warmest temp. during maximum 7-day average | Number of times 7-day average temperature exceeds DEQ standard | Site elevation |
|---|---|---|---|---|---|---|---|---|---|
| Hukill Creek @ road crossing, NW1/4 S15 | UR18 | BLM | ~ | 65.7 | 63.1 | 55.6 - 64.6 | Jul-17 | 0 | |
| Hungry Creek @ Morine Creek | UR19 | BLM | ~ | 63.4 | 62.6 | 58.1 - 64.4 | Aug-05 | 0 | |
| Imnaha Creek | UR20 | RRNF | 54.6 | 56.8 | 54.8 | 47.1 - 55.4 | Aug-05 | 0 | 3400 |
| Jackass Cr.k @ Big Butte Creek N. Fk. | UR21 | BLM | ~ | 71.3 | 66.5 | 57.2 - 68.9 | Aug-05 | 24 | |
| Morine Creek above Hungry Creek | UR22 | BLM | ~ | 63.5 | 61.3 | 59.9 -62.6 | Aug-05 | 0 | |
| Muir Creek | UR23 | RRNF | 56.3 | 59.1 | 57.3 | 45.0 - 57.7 | Jul-27 | 0 | 3900 |
| Mule Creek @ Section 21/28 line | UR24 | BLM | ~ | 66.7 | 61.6 | 58.1 - 63.5 | Aug-05 | 0 | |
| North Fork Big Butte Ck. above Camp Ck. | UR25 | BLM | ~ | 67.9 | 64.5 | 59.0 - 66.2 | Aug-05 | 21 | |
| North Fork Big Butte Cr.above South Fork | UR26 | BLM | ~ | 70.3 | 66.7 | 64.4 - 67.1 | Jul-18 | 36 | |
| North Fork Big Butte Cr.above Jackass Cr. | UR27 | BLM | ~ | 78.2 | 72.5 | 59.9 - 75.2 | Aug-05 | 70 | |
| Rancheria Creek @ lower BLM line | UR28 | BLM | ~ | 63.1 | 63.5 | 53.6 - 64.4 | Aug-05 | 0 | |
| Rogue River @ Dodge Bridge | UR29 | USGS | 62.0 | 67.8 | 61.7 | 51.8 - 61.2 | Aug-06 | 0 | |
| Rogue River @ McLeod | UR30 | USGS | 57.2 | 60.4 | 56.3 | 54.9 - 56.5 | Aug-26 | 0 | 1489 |
| Rogue River @ Trail | UR31 | USGS | 59.3 | 63.9 | 58.8 | 52.9 - 59.2 | Aug-06 | 0 | |
| Rogue River below Prospect | UR32 | USGS | ~ | 59.9 | 59.0 | 54.9 - 60.1 | Jul-28 | 0 | 1965 |
| South Fork Big Butte above North Fork | UR33 | BLM | ~ | 55.0 | 63.0 | 57.2 - 64.4 | Jul-17 | 0 | |
| South Fork Rogue River | UR34 | RRNF | 53.4 | 57.4 | 53.4 | 48.0 - 54.0 | Jun-29 | 0 | 3390 |



Average Discharge in Middle and South Forks
Discharge, CFS
250
225
200
175
150
125
100
75
50
25
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
South Fork near Imnaha: 52.0 s
Middle Fork: 56.6 sq. mi.

Station: **S FK ROGUE R SOUTH OF PROSPECT, OREG.**
ID: **14334700**
State: OREGON
County: JACKSON

Latitude: 42:42:45
Longitude: 122:30:20
Elevation: 2030.00
Drainage Area: 246.00

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1968 | 1992 | 25 | 8774 | 367.175 | 8000 | 54 |
| STREAM FLOW CFS | Minimum | 1988 | 1988 | 0 | 0 | 0 | 0 | 0 |
| STREAM FLOW CFS | Maximum | 1988 | 1988 | 0 | 0 | 0 | 0 | 0 |
| SUSP SED CONC MG/L | Mean | 1976 | 1981 | 6 | 1350 | 7.725 | 654 | 0 |
| SUSP SEDDISCHARGTONS/DAY | Mean | 1976 | 1981 | 6 | 1489 | 28.917 | 6180 | 0 |
| WATER TEMP CENT | Mean | 1974 | 1992 | 16 | 4773 | 7.78 | 18.2 | 0 |
| WATER TEMP CENT | Minimum | 1968 | 1992 | 25 | 8311 | 6.856 | 16 | -.1 |
| WATER TEMP CENT | Maximum | 1968 | 1992 | 25 | 8318 | 8.588 | 19.9 | 0 |

**Station: S FK ROGUE R SOUTH OF PROSPECT, OREG.** | **ID: 14334700**
**.rameter: Temperature, Water (Deg.C)** | **Statistic: Minimum**
**Year: 1968-1992** | **Latitude: 42:42:45**
**State: OREGON** | **Longitude: 122:30:20**
**County: JACKSON** | **Elevation: 2030.00**
**Drainage Area: 246.00**

14334700 SOUTH FORK ROGUE RIVER, SOUTH OF PROSPECT, OR
1985

LOCATION.--Lat 42 42'45", long 122 30'20", in NW1/4SE1/4 sec.7, T.33 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 200 ft upstream from unnamed tributary, 0.6 mi upstream from Smith Creek, 1.2 mi downstream from Beaver Creek, 2.8 mi southwest of Prospect, and at mile 2.4.

DRAINAGE AREA.--246 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,030 ft, from topographic map.

REMARKS.--No estimated daily discharges. Water-discharge records excellent. Some regulation by South Fork canal dam upstream. Power diversions upstream from station from South Fork Rogue River, Middle Fork Rogue River, and Red Blanket Creek divert water to Rogue River via Main Canal. During summer base flow all of streamflow is diverted for power except that for fish life. Base flow at station is principally from springs downstream from power diversions.

RAGE DISCHARGE.--17 years, 404 ft3/s, 292,700 acre-ft/yr.

.REMES FOR PERIOD OF RECORD.--Maximum discharge, 9,880 ft3/s Mar. 3, 1972, gage height, 12.71 ft, from floodmark; minimum, 54 ft3/s Aug. 16-19, 1977; minimum daily, 54 ft3/s Sept. 24-30, 1970.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1890, 20.1 ft, Dec. 22, 1964, from floodmarks at gage, discharge, 28,500 ft3/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,420 ft3/s June 7, gage height, 6.65 ft; minimum, 103 ft3/s Aug. 31, Sept. 1.

Station: **S FK ROGUE R SOUTH OF PROSPECT, OREG.**
rameter: Sediment Discharge, Suspended
Year: 1976-1981
State: OREGON
County: JACKSON

ID: 14334700
Statistic: Mean
Latitude: 42:42:45
Longitude: 122:30:20
Elevation: 2030.00
Drainage Area: 246.00

**Monthly Statistics**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **# Days** | 155 | 141 | 155 | 150 | 93 | 90 | 93 | 93 | 90 | 124 | 150 | 155 | 1489 |
| **Avg Day** | 56.28 | 7.01 | 4.24 | 4.68 | 8.89 | 1.89 | 0.596 | 0.614 | 1.66 | 1.07 | 59.53 | 139.8 | 28.92 |
| **Max Day** | 2800 | 124.0 | 42.00 | 47.00 | 122.0 | 12.00 | 3.80 | 2.40 | 87.00 | 12.00 | 6180 | 6090 | 6180 |
| **Min Day** | 0 | 0 | 0 | 0 | 0.870 | 0 | 0 | 0 | 0 | 0.230 | 0 | 0 | 0 |
| **# Months** | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 3 |
| **SDev Month** | 73.93 | 4.95 | 3.65 | 3.60 | 9.91 | 0.313 | 0.573 | 0.276 | 2.16 | 0.452 | 124.6 | 297.6 | 43.78 |
| **Skew Month** | 0.766 | -0.346 | 0.594 | 1.09 | 1.62 | 0.053 | 1.53 | -0.754 | 1.64 | 0.601 | 2.23 | 2.24 | 1.55 |
| **Min Month** | 0.230 | 0.493 | 0.522 | 1.43 | 2.03 | 1.58 | 0.177 | 0.317 | 0.182 | 0.592 | 0.329 | 0.029 | 1.25 |
| **Max Month** | 155.9 | 12.51 | 9.10 | 10.24 | 20.25 | 2.21 | 1.25 | 0.863 | 4.13 | 1.66 | 282.2 | 672.0 | 82.96 |
| **Exceedences** | | | | | | | | | | | | | |
| **1%** | 2514 | 101.9 | 38.15 | 41.00 | 122.0 | 12.00 | 3.80 | 2.40 | 87.00 | 10.51 | 3519 | 5953 | 348.6 |
| **5%** | 159.0 | 30.90 | 13.75 | 15.50 | 40.00 | 5.25 | 1.90 | 1.81 | 1.40 | 2.82 | 85.00 | 235.3 | 24.55 |
| **10%** | 15.00 | 14.80 | 7.85 | 12.00 | 22.40 | 4.60 | 1.37 | 1.06 | 0.960 | 1.70 | 12.00 | 67.00 | 11.00 |
| **20%** | 10.00 | 8.72 | 5.80 | 6.70 | 11.80 | 2.70 | 0.928 | 0.824 | 0.800 | 1.10 | 1.90 | 18.00 | 4.80 |
| **50%** | 1.55 | 2.80 | 2.55 | 2.90 | 4.10 | 1.30 | 0.335 | 0.530 | 0.410 | 0.830 | 0.560 | 1.30 | 1.00 |
| **80%** | 0.240 | 0.528 | 0.820 | 1.40 | 1.80 | 0.610 | 0.180 | 0.236 | 0.210 | 0.578 | 0.260 | 0.230 | 0.410 |
| **90%** | 0.220 | 0.420 | 0.260 | 0.640 | 1.50 | 0.470 | 0 | 0.220 | 0.200 | 0.460 | 0.230 | 0 | 0.230 |
| **95%** | 0.220 | 0.210 | 0.240 | 0.465 | 1.00 | 0.370 | 0 | 0.220 | 0 | 0.406 | 0 | 0 | 0 |
| **99%** | 0 | 0 | 0 | 0.255 | 0.870 | 0 | 0 | 0 | 0 | 0.230 | 0 | 0 | 0 |

Station: **S FK ROGUE R SOUTH OF PROSPECT, OREG.**
rameter: Streamflow (cfs)
Year: 1968-1992
State: OREGON
County: JACKSON

ID: 14334700
Statistic: Mean
Latitude: 42:42:45
Longitude: 122:30:20
Elevation: 2030.00
Drainage Area: 246.00

**Monthly Statistics**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **# Days** | 744 | 678 | 744 | 720 | 744 | 720 | 744 | 744 | 720 | 752 | 720 | 744 | 8774 |
| **Avg Day** | 487.9 | 472.0 | 556.8 | 517.7 | 620.0 | 499.7 | 206.2 | 127.6 | 123.7 | 128.3 | 251.0 | 424.6 | 367.2 |
| **Max Day** | 6500 | 5280 | 8000 | 2000 | 1630 | 2120 | 990.0 | 443.0 | 403.0 | 1050 | 3750 | 5600 | 8000 |
| **Min Day** | 80.00 | 69.00 | 84.00 | 93.00 | 92.00 | 80.00 | 57.00 | 55.00 | 54.00 | 56.00 | 58.00 | 58.00 | 54.00 |
| **# Months** | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| **SDev Month** | 317.0 | 322.5 | 447.6 | 242.1 | 272.1 | 290.4 | 129.3 | 54.93 | 46.88 | 52.98 | 167.0 | 365.9 | 163.7 |
| **Skew Month** | 0.892 | 1.39 | 2.45 | 0.412 | -0.021 | 0.421 | 0.864 | 0.993 | 0.417 | 0.861 | 1.55 | 1.56 | 0.381 |
| **Min Month** | 85.29 | 80.82 | 99.42 | 133.5 | 142.3 | 113.5 | 70.84 | 60.65 | 59.33 | 64.87 | 69.03 | 86.16 | 114.5 |
| **Max Month** | 1143 | 1331 | 2240 | 1058 | 1049 | 1043 | 478.8 | 256.8 | 213.7 | 251.2 | 760.7 | 1327 | 672.3 |
| **Exceedences** | | | | | | | | | | | | | |
| **1%** | 3538 | 2604 | 2406 | 1348 | 1410 | 1466 | 701.8 | 329.9 | 279.8 | 396.9 | 1540 | 2684 | 1860 |
| **5%** | 1456 | 1253 | 1488 | 1050 | 1200 | 1070 | 552.0 | 238.8 | 232.0 | 271.8 | 779.0 | 1316 | 1030 |
| **10%** | 939.8 | 827.0 | 1112 | 886.0 | 1066 | 940.0 | 432.8 | 207.6 | 206.0 | 216.0 | 530.0 | 922.2 | 808.0 |
| **20%** | 629.2 | 618.4 | 749.6 | 734.0 | 895.4 | 794.0 | 319.2 | 175.0 | 170.0 | 163.6 | 344.0 | 651.2 | 576.0 |
| **50%** | 329.0 | 350.0 | 402.0 | 472.0 | 592.0 | 451.0 | 140.0 | 107.0 | 110.0 | 105.0 | 142.0 | 236.0 | 227.0 |
| **80%** | 138.0 | 196.2 | 235.0 | 264.3 | 338.8 | 188.0 | 94.00 | 81.20 | 75.90 | 78.00 | 96.00 | 124.8 | 105.0 |
| **90%** | 110.4 | 136.8 | 155.2 | 202.0 | 233.4 | 133.6 | 85.00 | 64.40 | 63.00 | 66.00 | 83.78 | 109.4 | 87.00 |
| **95%** | 93.00 | 95.90 | 112.6 | 157.0 | 177.6 | 106.0 | 72.20 | 60.00 | 59.00 | 62.00 | 72.00 | 89.00 | 71.00 |
| **99%** | 83.00 | 76.00 | 91.88 | 108.0 | 104.2 | 93.20 | 61.00 | 56.44 | 56.00 | 58.00 | 60.20 | 64.44 | 59.00 |

Station: **S FK ROGUE R SOUTH OF PROSPECT, OREG.**
.rameter: Temperature, Water (Deg.C)
Year: 1968-1992
State: OREGON
County: JACKSON

ID: 14334700
Statistic: Minimum
Latitude: 42:42:45
Longitude: 122:30:20
Elevation: 2030.00
Drainage Area: 246.00

**Monthly Statistics**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **# Days** | 744 | 671 | 709 | 633 | 707 | 661 | 683 | 698 | 701 | 675 | 692 | 737 | 8311 |
| **Avg Day** | 3.40 | 4.01 | 4.84 | 5.62 | 6.80 | 9.13 | 11.92 | 11.89 | 9.58 | 7.03 | 4.92 | 3.54 | 6.86 |
| **Max Day** | 7.60 | 6.70 | 8.47 | 11.00 | 13.00 | 15.00 | 16.00 | 14.50 | 13.30 | 10.40 | 8.50 | 6.50 | 16.00 |
| **Min Day** | -0.100 | 0 | 2.00 | 3.00 | 3.30 | 5.00 | 6.90 | 8.40 | 5.86 | 2.20 | 0 | -0.100 | -0.100 |
| **# Months** | 24 | 23 | 20 | 20 | 22 | 21 | 21 | 22 | 22 | 20 | 22 | 22 | 13 |
| **SDev Month** | 0.677 | 0.746 | 0.725 | 0.873 | 1.25 | 1.33 | 1.18 | 0.913 | 0.760 | 0.734 | 0.831 | 0.833 | 0.368 |
| **Skew Month** | 0.282 | -0.102 | 1.22 | 0.202 | 0.783 | -0.040 | -0.509 | -0.277 | 0.555 | 0.410 | -0.783 | 0.267 | -0.334 |
| **Min Month** | 2.15 | 2.48 | 3.53 | 4.02 | 4.14 | 6.51 | 9.79 | 9.91 | 8.27 | 5.87 | 2.89 | 2.19 | 6.34 |
| **Max Month** | 4.73 | 5.19 | 7.03 | 7.33 | 10.47 | 11.87 | 13.37 | 13.77 | 11.44 | 8.59 | 6.19 | 5.29 | 7.48 |
| **Exceedences** | | | | | | | | | | | | | |
| **1%** | 5.81 | 6.42 | 7.59 | 9.19 | 11.97 | 14.00 | 15.00 | 14.50 | 12.50 | 10.00 | 8.01 | 6.00 | 14.00 |
| **5%** | 5.18 | 5.60 | 6.62 | 7.50 | 9.50 | 12.50 | 14.30 | 14.00 | 12.00 | 9.00 | 7.20 | 5.60 | 12.90 |
| **10%** | 4.80 | 5.50 | 6.10 | 7.04 | 8.50 | 11.99 | 14.00 | 13.62 | 11.50 | 8.90 | 6.70 | 5.00 | 12.00 |
| **20%** | 4.40 | 5.00 | 5.60 | 6.70 | 7.90 | 10.88 | 13.40 | 13.00 | 10.88 | 8.30 | 6.00 | 4.60 | 10.12 |
| **50%** | 3.40 | 4.04 | 4.90 | 5.51 | 6.70 | 9.00 | 12.00 | 11.97 | 9.60 | 7.00 | 5.00 | 3.60 | 6.00 |
| **80%** | 2.50 | 3.20 | 4.00 | 4.50 | 5.60 | 7.50 | 10.60 | 10.90 | 8.38 | 5.96 | 3.90 | 2.50 | 4.00 |
| **90%** | 2.00 | 2.70 | 3.50 | 4.03 | 5.00 | 6.80 | 9.79 | 10.08 | 7.75 | 5.49 | 3.20 | 1.81 | 3.20 |
| **95%** | 1.50 | 1.79 | 3.05 | 3.80 | 4.44 | 6.12 | 8.92 | 9.60 | 7.19 | 4.92 | 2.50 | 1.00 | 2.50 |
| **99%** | 0.444 | 0.413 | 2.50 | 3.30 | 3.33 | 5.56 | 8.30 | 8.90 | 6.20 | 4.00 | 1.05 | 0.500 | 1.00 |

## 14334700 SOUTH FORK ROGUE RIVER, SOUTH OF PROSPECT, OR

LOCATION.--Lat 42°42'45", long 122°30'20", in NW 1/4 SE 1/4 sec.7, T.33 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 200 ft upstream from unnamed tributary, 0.6 mi upstream from Smith Creek, 1.2 mi downstream from Beaver Creek, 2.8 mi southwest of Prospect, and at mile 2.4.

DRAINAGE AREA.--246 $mi^2$.

PERIOD OF RECORD.--October 1968 to 1987.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 2,030 ft, from topographic map.

REMARKS.--Some regulation by South Fork canal dam upstream. Power diversions upstream from station from South Fork Rogue River, Middle Fork Rogue River, and Red Blanket Creek divert water to Rogue River via Main Canal. During summer base flow all of streamflow is diverted for power except that for fish life. Base flow at station is principally from springs downstream from power diversions.

AVERAGE DISCHARGE.--19 years, 396 $ft^3/s$, 286,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,880 $ft^3/s$ Mar. 3, 1972, gage height, 12.71 ft, from floodmark; minimum discharge, 54 $ft^3/s$ Sept. 24-30, 1970, but may have been lower during period of no record Sept. 24-30, 1970, Aug. 16-18, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1890, 20.1 ft, Dec. 22, 1964, from floodmarks at gage, discharge, 28,500 $ft^3/s$.

### STATISTICAL SUMMARIES

[n = number of values used to compute statistics]

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW
BASED ON PERIOD OF RECORD 1970-1987

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL NON-EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 20<br>5% | 50<br>2% | 100<br>1% |
| 1 | 18 | 85 | 65 | 56 | 51 | -- | -- |
| 3 | 18 | 86 | 65 | 57 | 51 | -- | -- |
| 7 | 18 | 88 | 66 | 58 | 52 | -- | -- |
| 14 | 18 | 91 | 67 | 58 | 52 | -- | -- |
| 30 | 18 | 95 | 70 | 60 | 54 | -- | -- |
| 60 | 18 | 103 | 76 | 65 | 58 | -- | -- |
| 90 | 18 | 109 | 79 | 67 | 59 | -- | -- |
| 120 | 18 | 117 | 83 | 71 | 62 | -- | -- |
| 183 | 18 | 166 | 121 | 104 | 92 | -- | -- |

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW
BASED ON PERIOD OF RECORD 1969-1987

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 1 | 19 | 2380 | 4540 | 6220 | 8570 | -- | -- |
| 3 | 19 | 1990 | 3580 | 4750 | 6330 | -- | -- |
| 7 | 19 | 1590 | 2680 | 3420 | 4360 | -- | -- |
| 15 | 19 | 1230 | 1940 | 2400 | 2960 | -- | -- |
| 30 | 19 | 989 | 1490 | 1790 | 2130 | -- | -- |
| 60 | 19 | 779 | 1120 | 1300 | 1490 | -- | -- |
| 90 | 19 | 700 | 1010 | 1170 | 1340 | -- | -- |

MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW
BASED ON PERIOD OF RECORD 1965-1987

DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT

| 1.25<br>80% | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
|---|---|---|---|---|---|---|
| 1650 | 3060 | 5810 | 8190 | 11900 | -- | -- |

Systematic n = 18 historical n = 98
Generalized 17b skew = 0.120

## 14334700 SOUTH FORK ROGUE RIVER, SOUTH OF PROSPECT, OR

LOCATION.--Lat 42°42'45", long 122°30'20", in NW 1/4 SE 1/4 sec.7, T.33 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 200 ft upstream from unnamed tributary, 0.6 mi upstream from Smith Creek, 1.2 mi downstream from Beaver Creek, 2.8 mi southwest of Prospect, and at mile 2.4.

DRAINAGE AREA.--246 $mi^2$.

PERIOD OF RECORD.--October 1968 to 1987.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 2,030 ft, from topographic map.

REMARKS.--Some regulation by South Fork canal dam upstream. Power diversions upstream from station from South Fork Rogue River, Middle Fork Rogue River, and Red Blanket Creek divert water to Rogue River via Main Canal. During summer base flow all of streamflow is diverted for power except that for fish life. Base flow at station is principally from springs downstream from power diversions.

AVERAGE DISCHARGE.--19 years, 396 $ft^3/s$, 286,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,880 $ft^3/s$ Mar. 3, 1972, gage height, 12.71 ft, from floodmark; minimum discharge, 54 $ft^3/s$ Sept. 24-30, 1970, but may have been lower during period of no record Sept. 24-30, 1970, Aug. 16-19, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1890, 20.1 ft, Dec. 22, 1964, from floodmarks at gage, discharge, 28,500 $ft^3/s$.

### STATISTICAL SUMMARIES FOR THE PERIOD 1969-1987

[n = number of values used to compute statistics; months are abbreviated; Ann = annual]

Monthly and annual statistics based on mean daily discharge, in cubic feet per second

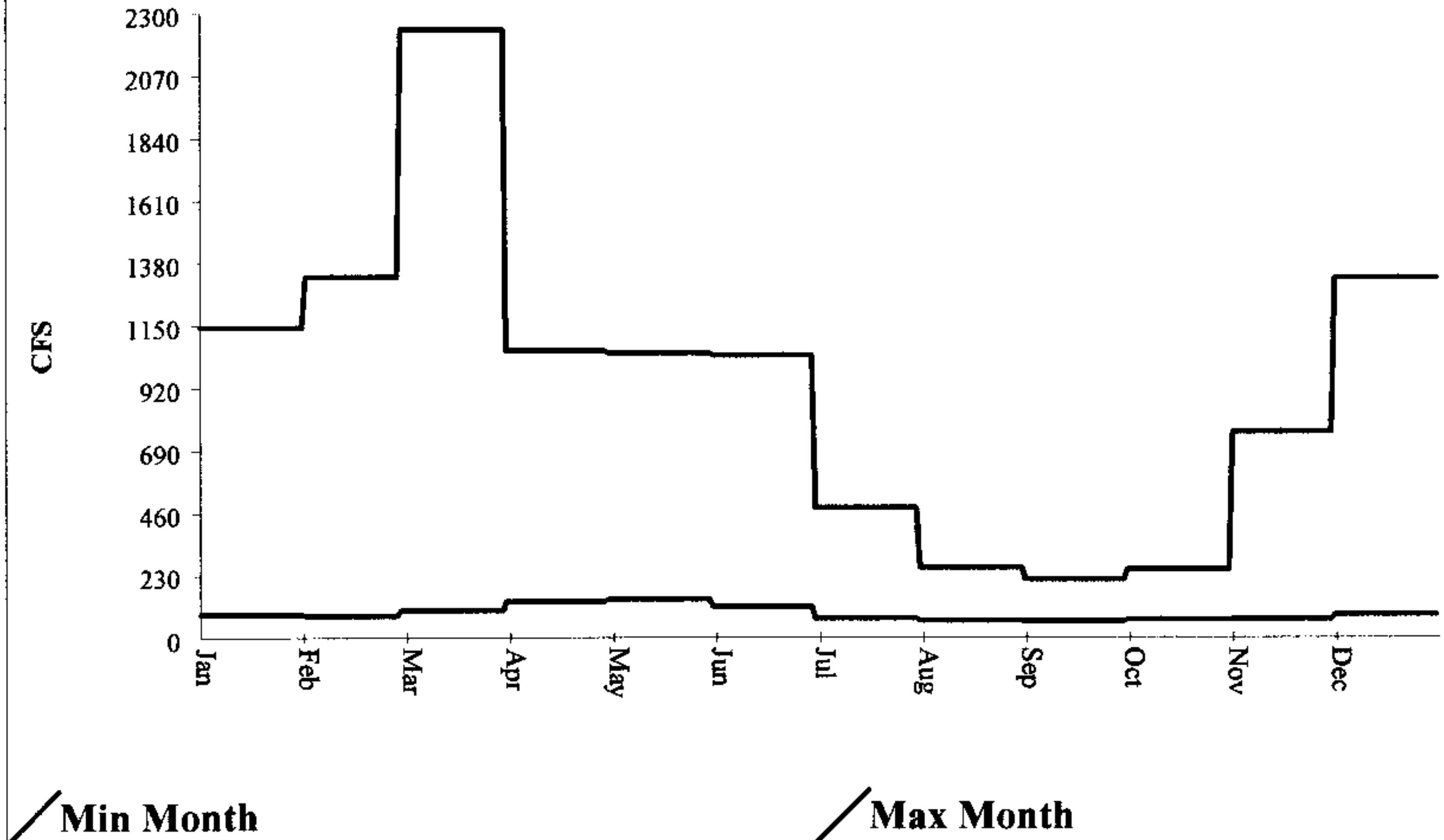
| Month | n | Minimum | (year) | Maximum | (year) | Mean | Standard deviation | Percent of annual runoff |
|---|---|---|---|---|---|---|---|---|
| Oct | 19 | 64 | 1969 | 251 | 1985 | 133 | 56 | 3.0 |
| Nov | 19 | 69 | 1970 | 761 | 1974 | 274 | 178 | 5.9 |
| Dec | 19 | 86 | 1977 | 1330 | 1982 | 488 | 388 | 10.9 |
| Jan | 19 | 85 | 1977 | 1140 | 1971 | 548 | 328 | 12.2 |
| Feb | 19 | 80 | 1977 | 1330 | 1986 | 537 | 333 | 10.9 |
| Mar | 19 | 99 | 1977 | 2240 | 1972 | 588 | 474 | 13.1 |
| Apr | 19 | 133 | 1977 | 878 | 1974 | 517 | 225 | 11.2 |
| May | 18 | 253 | 1977 | 1050 | 1969 | 641 | 267 | 14.3 |
| Jun | 18 | 150 | 1973 | 1040 | 1984 | 506 | 305 | 10.9 |
| Jul | 18 | 70 | 1977 | 479 | 1984 | 218 | 137 | 4.9 |
| Aug | 18 | 60 | 1970 | 257 | 1984 | 131 | 59 | 2.9 |
| Sep | 19 | 46 | 1972 | 214 | 1984 | 121 | 52 | 2.6 |
| Ann | | 114 | 1977 | 641 | 1984 | 380 | 157 | 100.0 |

Flow duration statistics based on mean daily discharge

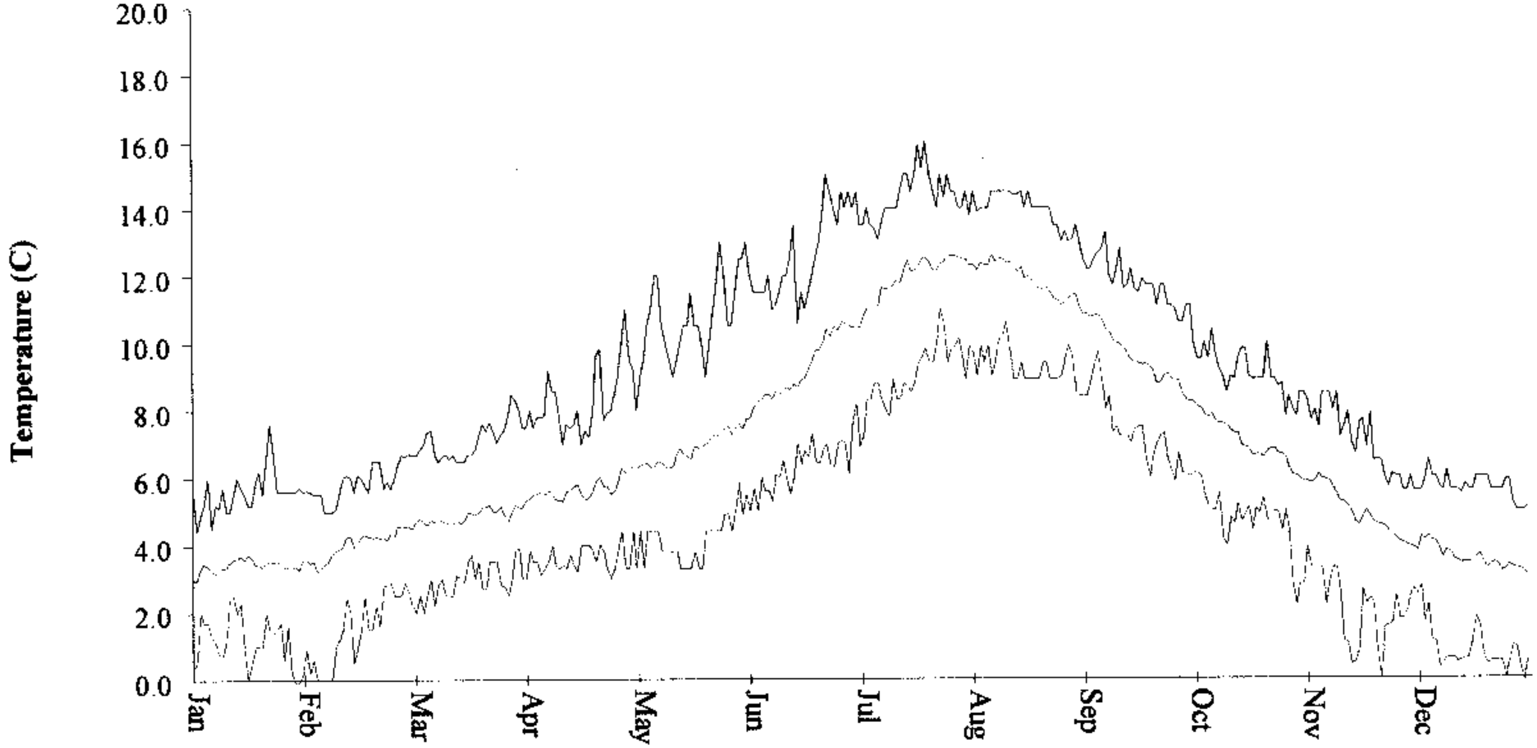
Discharge, in cubic feet per second, which was equaled or exceeded for indicated percent of time

| Month | 95 | 90 | 85 | 80 | 75 | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5 | (n) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct | 61 | 64 | 69 | 73 | 82 | 87 | 101 | 113 | 124 | 140 | 151 | 167 | 200 | 228 | 293 | 19 |
| Nov | 68 | 81 | 89 | 95 | 103 | 112 | 132 | 159 | 196 | 258 | 318 | 398 | 466 | 577 | 835 | 19 |
| Dec | 86 | 104 | 119 | 133 | 148 | 168 | 232 | 314 | 416 | 557 | 641 | 734 | 850 | 1030 | 1430 | 19 |
| Jan | 89 | 106 | 131 | 157 | 209 | 237 | 300 | 395 | 466 | 559 | 619 | 706 | 829 | 1040 | 1650 | 19 |
| Feb | 91 | 171 | 202 | 228 | 255 | 291 | 348 | 407 | 482 | 571 | 624 | 693 | 786 | 907 | 1420 | 19 |
| Mar | 122 | 175 | 226 | 257 | 283 | 305 | 363 | 424 | 504 | 612 | 681 | 771 | 898 | 1110 | 1620 | 19 |
| Apr | 162 | 202 | 243 | 272 | 306 | 343 | 416 | 489 | 557 | 635 | 681 | 729 | 780 | 861 | 972 | 19 |
| May | 206 | 261 | 315 | 350 | 380 | 429 | 520 | 622 | 701 | 784 | 847 | 910 | 971 | 1090 | 1220 | 18 |
| Jun | 116 | 136 | 168 | 197 | 223 | 248 | 316 | 438 | 559 | 674 | 738 | 821 | 890 | 959 | 1100 | 18 |
| Jul | 70 | 79 | 87 | 93 | 98 | 104 | 122 | 151 | 195 | 260 | 308 | 347 | 393 | 460 | 558 | 18 |
| Aug | 59 | 63 | 66 | 72 | 81 | 88 | 102 | 115 | 135 | 155 | 165 | 180 | 196 | 218 | 249 | 18 |
| Sep | 50 | 60 | 62 | 64 | 68 | 76 | 96 | 114 | 126 | 138 | 147 | 173 | 196 | 220 | 239 | 19 |
| Ann | 67 | 83 | 95 | 108 | 122 | 139 | 189 | 251 | 339 | 450 | 520 | 600 | 694 | 821 | 1030 | |

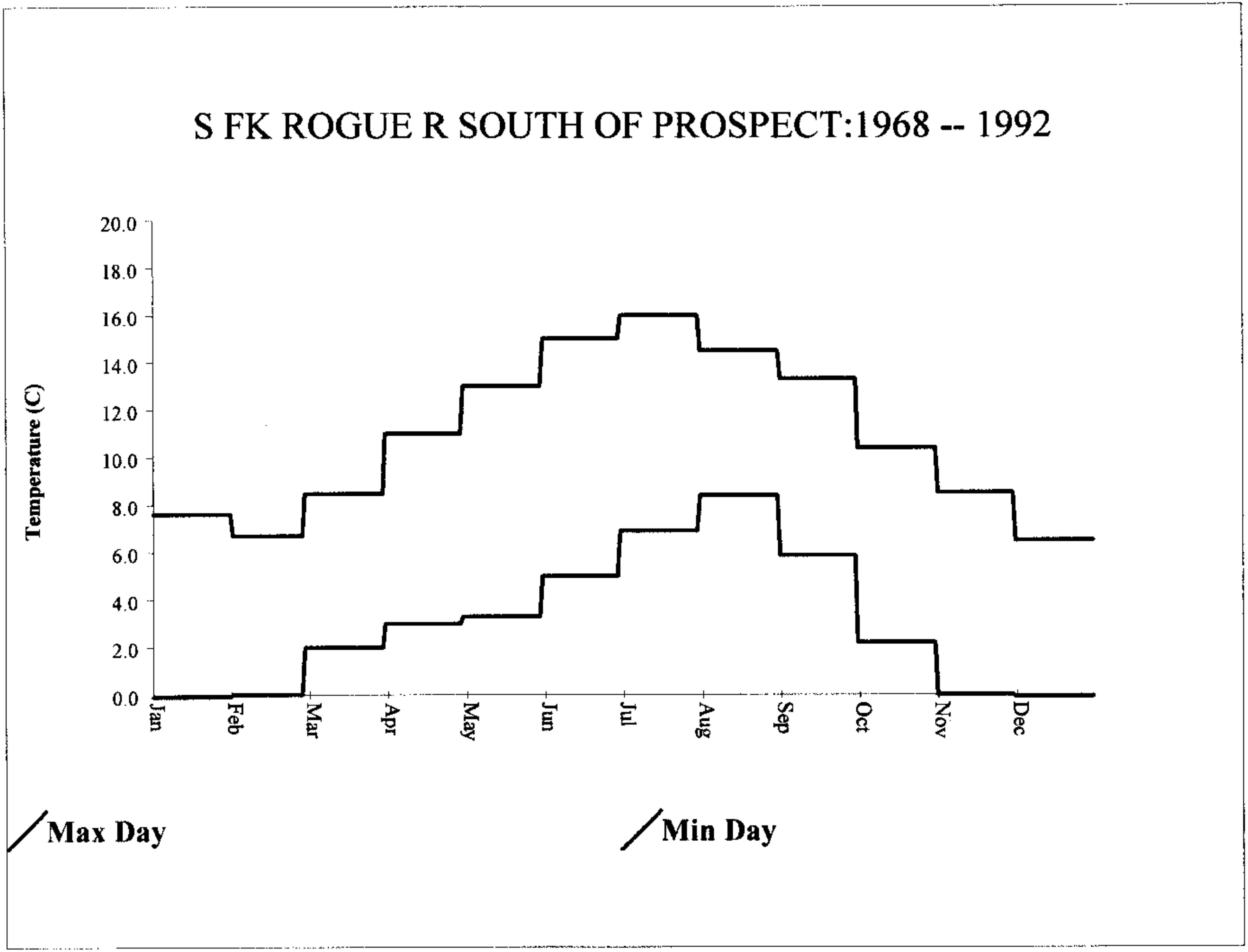
# S FK ROGUE R SOUTH OF PROSPECT: 14334700

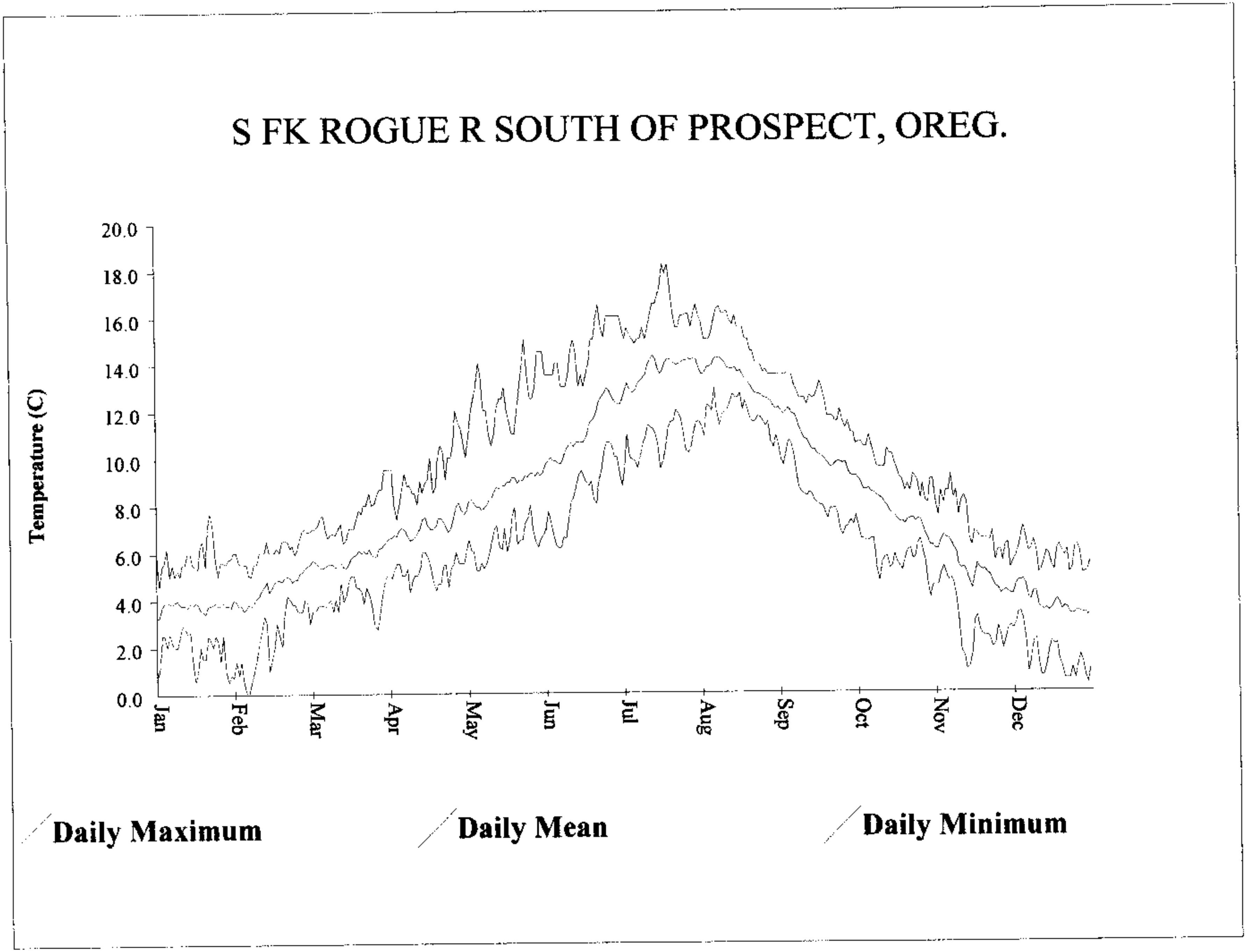


# S FK ROGUE R SOUTH OF PROSPECT: 1969 -- 1992

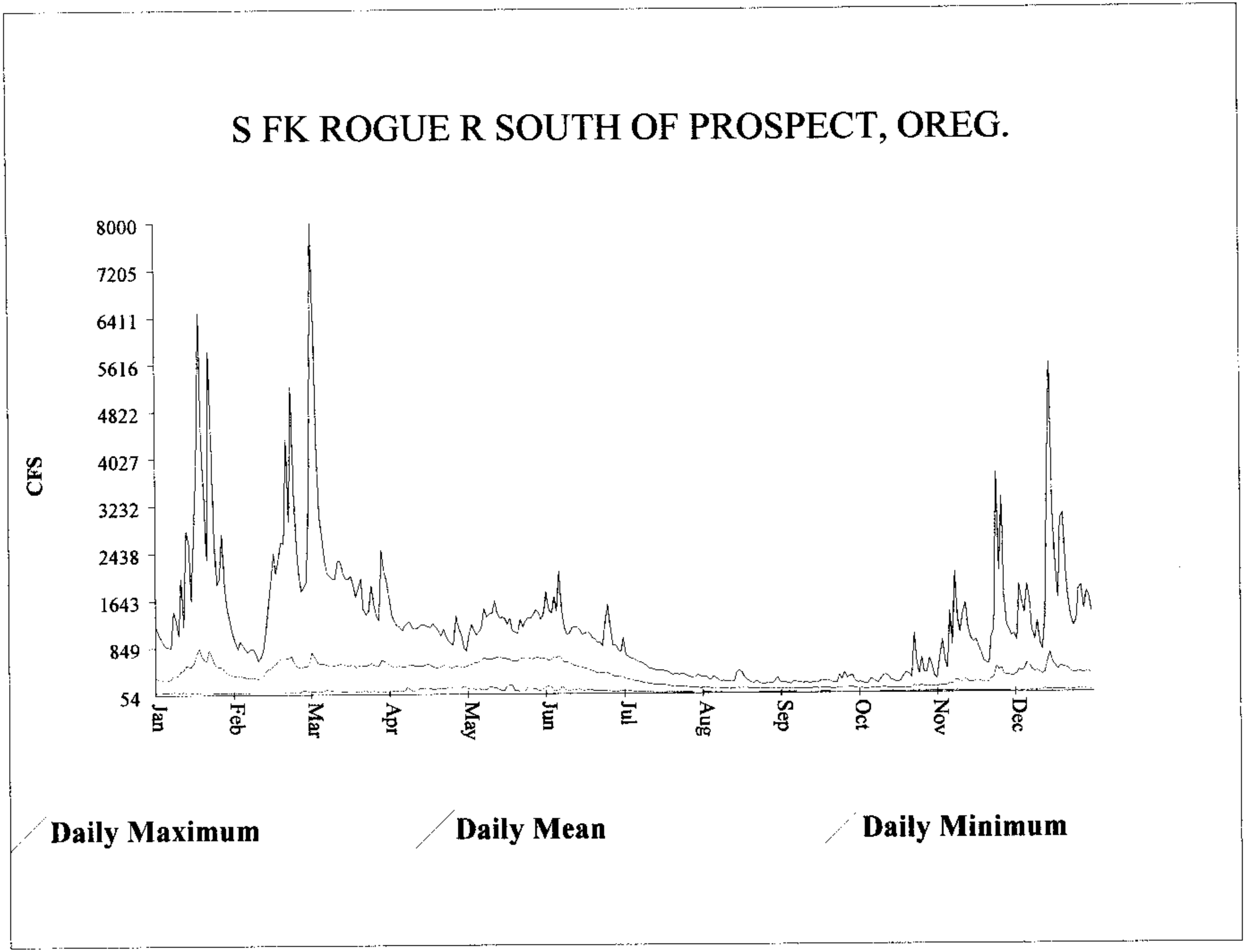



**Daily Maximum** **Daily Mean** **Daily Minimum**


S FK ROGUE R SOUTH OF PROSPECT:1968 -- 1992
Temperature (C)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Max Day
Min Day



S FK ROGUE R SOUTH OF PROSPECT, OREG.
Temperature (C)
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Daily Maximum
Daily Mean
Daily Minimum

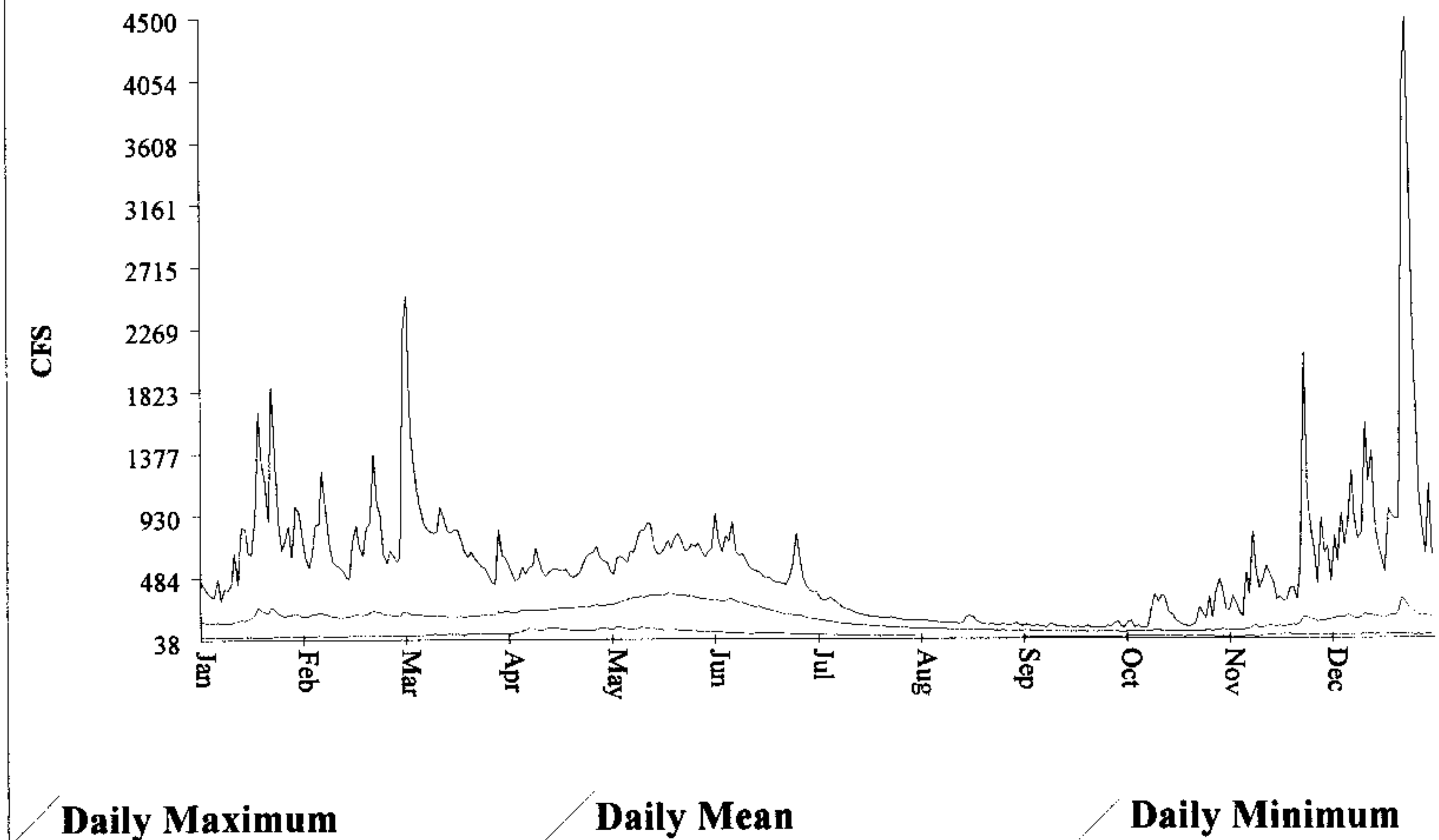

S FK ROGUE R SOUTH OF PROSPECT, OREG.
CFS
8000
7205
6411
5616
4822
4027
3232
2438
1643
849
54
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Daily Maximum
Daily Mean
Daily Minimum

Station: **SF ROGUE RIVER AND SF P CA NR PROSPECT,OREG.**
ID: **14332001**
State: OREGON
County: JACKSON

Latitude: 42:42:30
Longitude: 122:23:30
Elevation:
Drainage Area: 83.80

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1924 | 1963 | 43 | 14974 | 181.82 | 4500 | 38 |

# SF ROGUE RIVER AND SF P CA NR PROSPECT,OREG.

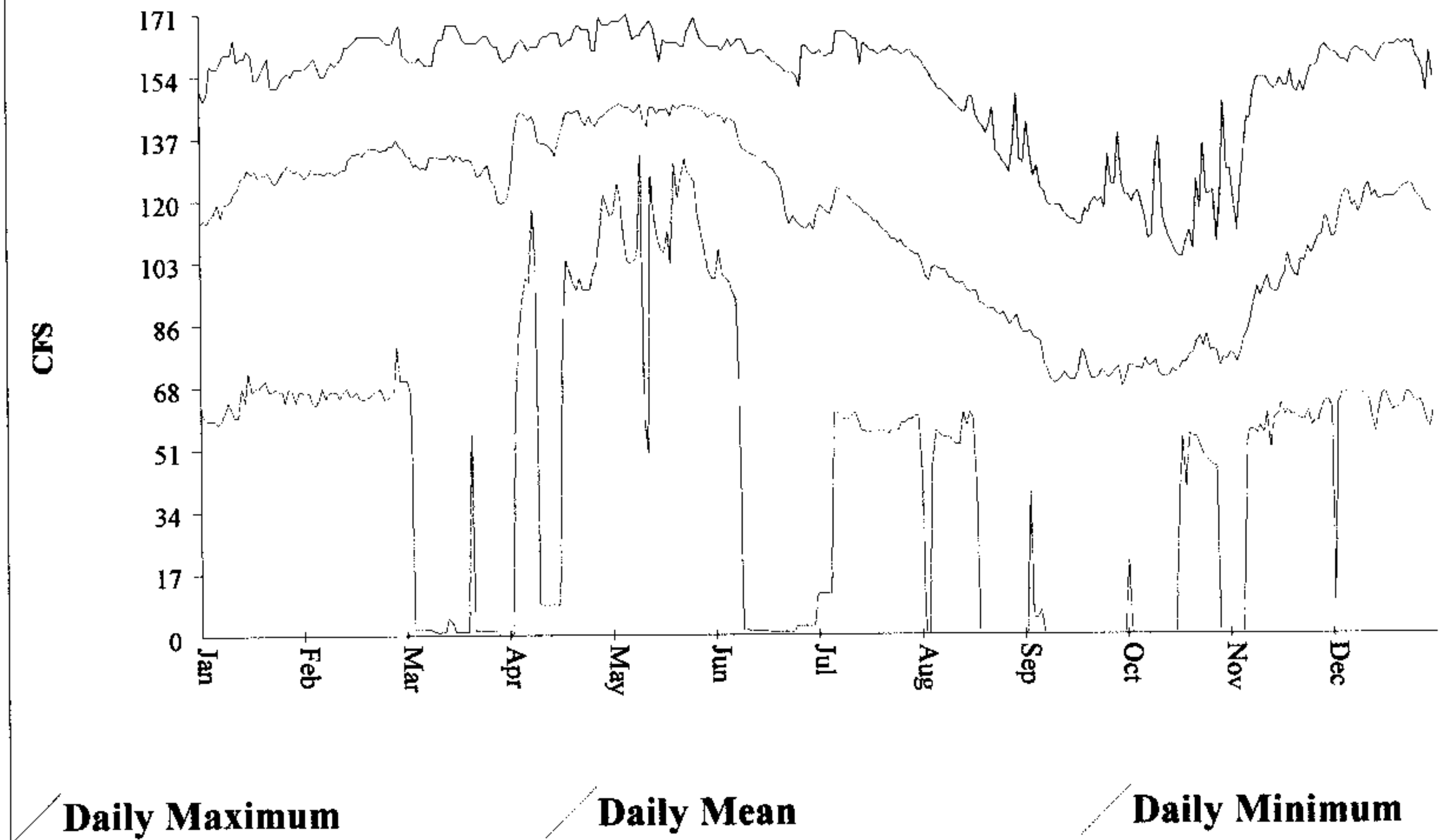


Station: **SOUTH FORK POWER CANAL NEAR PROSPECT, OREG.**
ID: **14331500**
State: OREGON
County: JACKSON

Latitude: 42:42:50
Longitude: 122:24:15
Elevation:
Drainage Area: 0.00

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1965 | 1983 | 19 | 6574 | 113.757 | 171 | 0 |
| STREAM STAGE FEET | E.Mean | 1976 | 1977 | 2 | 357 | 8.657 | 16.9 | 0 |

# SOUTH FORK POWER CANAL NEAR PROSPECT, OREG.



Station: **IMNAHA CREEK NEAR PROSPECT, OREG.**
ID: **14331000**
State: OREGON
County: JACKSON

Latitude: 42:42:00
Longitude: 122:23:00
Elevation: 3400.00
Drainage Area: 26.00

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1933 | 1949 | 17 | 5844 | 43.028 | 500 | 15 |

## 14331000 IMNAHA CREEK NEAR PROSPECT, OR

LOCATION.--Lat 42°41'20", long 122°23'00", in NE 1/4 sec.18, T.33 S., R.4 E., Jackson County, Hydrologic Unit 17100307, on left bank 1,200 ft upstream from mouth and 6 mi southeast of Prospect.

DRAINAGE AREA.--26 mi², approximately.

PERIOD OF RECORD.--September 1931 to October 1949.

GAGE.--Staff gage. Elevation of gage is 3,400 ft, from river-profile map.

REMARKS.--No diversion or regulation upstream from station.

AVERAGE DISCHARGE.--18 years (water years 1932-49), 42.8 ft³/s.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 500 ft³/s Feb. 13, 1945, gage not read, computed on basis of records for South and Middle Forks Rogue River near Prospect; minimum observed, 11 ft³/s Dec. 14, 1931, gage height, 0.46 ft.

### STATISTICAL SUMMARIES

[n = number of values used to compute statistics]

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW
BASED ON PERIOD OF RECORD 1935-1949

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL NON-EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 20<br>5% | 50<br>2% | 100<br>1% |
| 1 | 15 | 19 | 16 | 15 | 15 | -- | -- |
| 3 | 15 | 19 | 17 | 16 | 15 | -- | -- |
| 7 | 15 | 19 | 17 | 16 | 15 | -- | -- |
| 14 | 15 | 20 | 17 | 16 | 16 | -- | -- |
| 30 | 15 | 20 | 18 | 17 | 16 | -- | -- |
| 60 | 15 | 20 | 18 | 17 | 16 | -- | -- |
| 90 | 15 | 21 | 18 | 17 | 17 | -- | -- |
| 120 | 15 | 22 | 19 | 18 | 17 | -- | -- |
| 183 | 15 | 25 | 21 | 19 | 18 | -- | -- |

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW
BASED ON PERIOD OF RECORD 1934-1949

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 1 | 16 | 163 | 277 | 368 | 501 | -- | -- |
| 3 | 16 | 141 | 222 | 281 | 361 | -- | -- |
| 7 | 16 | 118 | 175 | 214 | 264 | -- | -- |
| 15 | 16 | 104 | 147 | 175 | 208 | -- | -- |
| 30 | 16 | 93 | 128 | 150 | 175 | -- | -- |
| 60 | 16 | 81 | 110 | 126 | 145 | -- | -- |
| 90 | 16 | 72 | 95 | 108 | 123 | -- | -- |

MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW
BASED ON PERIOD OF RECORD 1934-1949

| DISCHARGE, IN FT³/S, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | | |
|---|---|---|---|---|---|---|
| 1.25<br>80% | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 100 | 168 | 289 | 386 | 529 | -- | -- |

Systematic n = 16 historical n = 0
Generalized 17b skew = 0.131

## 14331000 IMNAHA CREEK NEAR PROSPECT, OR

LOCATION.--Lat 42°41'20", long 122°23'00", in NE 1/4 sec.18, T.33 S., R.4 E., Jackson County, Hydrologic Unit 17100307, on left bank 1,200 ft upstream from mouth and 6 mi southeast of Prospect.

DRAINAGE AREA.--26 $mi^2$, approximately.

PERIOD OF RECORD.--September 1931 to October 1949.

GAGE.--Staff gage. Elevation of gage is 3,400 ft, from river-profile map.

REMARKS.--No diversion or regulation upstream from station.

AVERAGE DISCHARGE.--18 years (water years 1932-49), 42.8 $ft^3/s$.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 500 $ft^3/s$ Feb. 13, 1945, gage not read, computed on basis of records for South and Middle Forks Rogue River near Prospect; minimum observed, 11 $ft^3/s$ Dec. 14, 1931, gage height, 0.46 ft.

### STATISTICAL SUMMARIES FOR THE PERIOD 1934-1949

[n = number of values used to compute statistics; months are abbreviated; Ann = annual]

Monthly and annual statistics based on mean daily discharge, in cubic feet per second

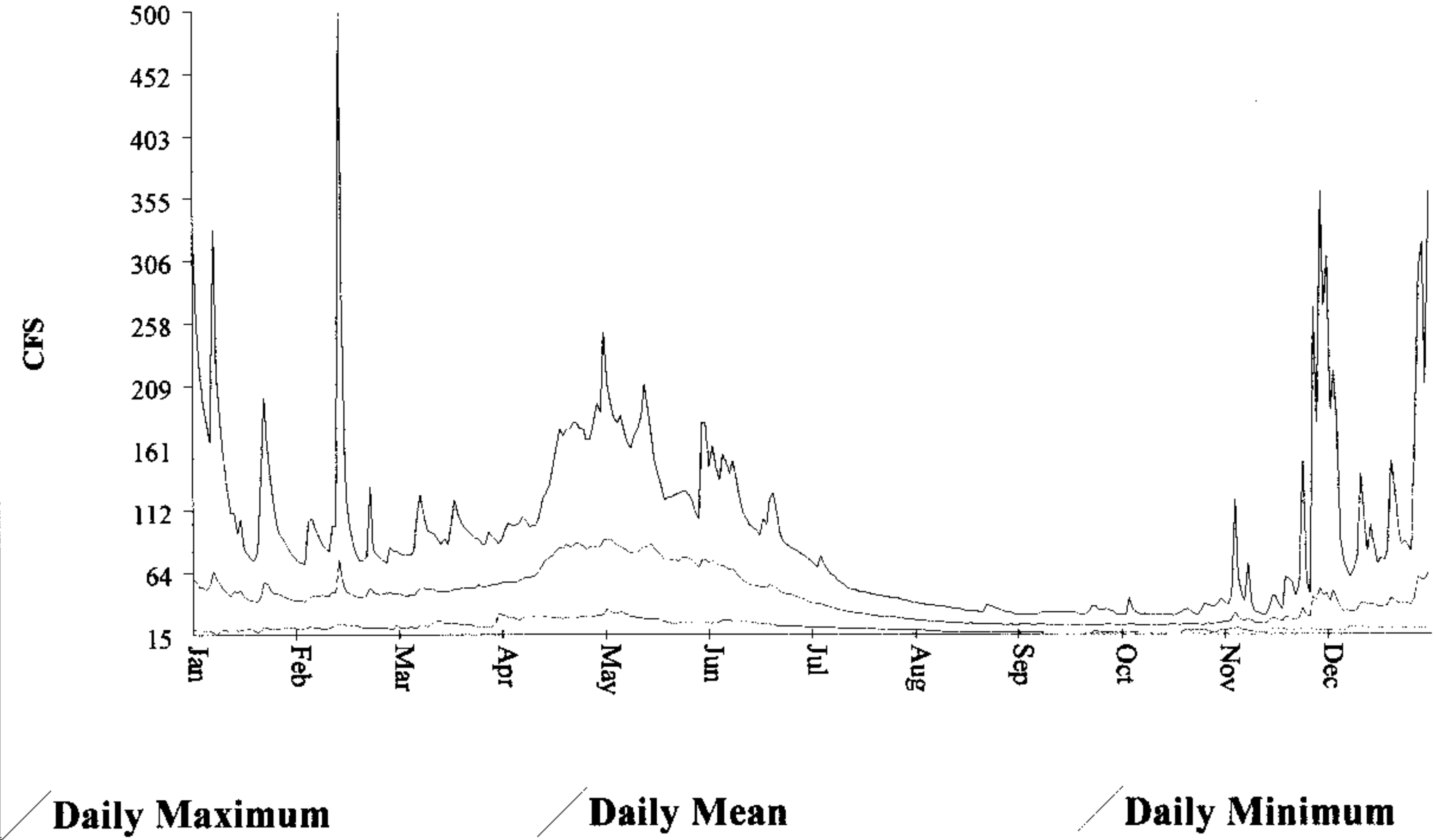
| Month | n | Minimum | (year) | Maximum | (year) | Mean | Standard deviation | Percent of annual runoff |
|---|---|---|---|---|---|---|---|---|
| Oct | 16 | 16 | 1935 | 31 | 1944 | 22 | 4.0 | 4.3 |
| Nov | 16 | 19 | 1940 | 66 | 1943 | 28 | 11 | 5.5 |
| Dec | 16 | 20 | 1936 | 107 | 1943 | 40 | 22 | 8.0 |
| Jan | 16 | 18 | 1937 | 126 | 1943 | 48 | 28 | 9.6 |
| Feb | 16 | 20 | 1937 | 84 | 1945 | 46 | 17 | 8.4 |
| Mar | 16 | 21 | 1937 | 81 | 1943 | 49 | 16 | 9.7 |
| Apr | 16 | 28 | 1941 | 115 | 1949 | 70 | 25 | 13.5 |
| May | 16 | 26 | 1934 | 148 | 1949 | 78 | 34 | 15.4 |
| Jun | 16 | 22 | 1934 | 112 | 1948 | 55 | 23 | 10.6 |
| Jul | 16 | 19 | 1934 | 53 | 1948 | 31 | 8.9 | 6.3 |
| Aug | 16 | 16 | 1934 | 35 | 1948 | 23 | 4.8 | 4.6 |
| Sep | 16 | 15 | 1934 | 32 | 1948 | 21 | 4.1 | 4.1 |
| Ann | | 26 | 1934 | 69 | 1943 | 43 | 11 | 100.0 |

Flow duration statistics based on mean daily discharge

Discharge, in cubic feet per second, which was equaled or exceeded for indicated percent of time

| Month | 95 | 90 | 85 | 80 | 75 | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5 | (n) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct | 17 | 18 | 19 | 19 | 20 | 20 | 21 | 22 | 22 | 23 | 24 | 25 | 26 | 29 | 31 | 16 |
| Nov | 19 | 20 | 20 | 21 | 21 | 22 | 23 | 24 | 25 | 28 | 29 | 31 | 35 | 39 | 48 | 16 |
| Dec | 20 | 21 | 22 | 23 | 24 | 26 | 28 | 29 | 33 | 39 | 44 | 48 | 57 | 67 | 85 | 16 |
| Jan | 20 | 24 | 27 | 28 | 29 | 30 | 32 | 37 | 42 | 50 | 55 | 61 | 71 | 87 | -- | 16 |
| Feb | 23 | 28 | 30 | 32 | 33 | 35 | 39 | 43 | 47 | 51 | 55 | 60 | 66 | 70 | 77 | 16 |
| Mar | 24 | 29 | 31 | 35 | 37 | 39 | 42 | 45 | 51 | 57 | 60 | -- | -- | -- | -- | 16 |
| Apr | 29 | 30 | 38 | 44 | 48 | 50 | 56 | 62 | 75 | -- | -- | -- | -- | -- | -- | 16 |
| May | 30 | 34 | 39 | 43 | 49 | 53 | 63 | 77 | 87 | -- | -- | -- | -- | -- | -- | 16 |
| Jun | 24 | 26 | 32 | 34 | 38 | 41 | 45 | 50 | 56 | 65 | 71 | -- | -- | -- | -- | 16 |
| Jul | 20 | 21 | 23 | 25 | 26 | 27 | 29 | 30 | 32 | 35 | 37 | 39 | 41 | 45 | -- | 16 |
| Aug | 17 | 18 | 19 | 20 | 20 | 21 | 22 | 23 | 24 | 26 | 27 | 27 | 28 | 30 | 34 | 16 |
| Sep | 17 | 18 | 18 | 19 | 19 | 20 | 20 | 21 | 22 | 24 | 25 | 26 | 26 | 28 | 32 | 16 |
| Ann | 18 | 20 | 21 | 22 | 23 | 24 | 28 | 31 | 38 | 47 | 51 | 59 | 69 | 83 | 101 | |

# IMNAHA CREEK NEAR PROSPECT, OREG.



Station: **SOUTH FORK ROGUE RIVER NEAR PROSPECT, OREG.**
ID: **14332000**
State: OREGON
County: JACKSON

Latitude: 42:42:30
Longitude: 122:23:30
Elevation: 3300.00
Drainage Area: 83.80

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1967 | 1995 | 29 | 10061 | 64.81 | 2420 | 0 |
| STREAM FLOW CFS | Minimum | 1988 | 1988 | 0 | 0 | 0 | 0 | 0 |
| STREAM FLOW CFS | Maximum | 1988 | 1988 | 0 | 0 | 0 | 0 | 0 |

**Station:** **SOUTH FORK ROGUE RIVER NEAR PROSPECT, OREG.**
**.rameter:** **Streamflow (cfs)**
**Year:** **1967-1995**
**State:** **OREGON**
**County:** **JACKSON**

**ID:** 14332000
**Statistic:** **Mean**
**Latitude:** **42:42:30**
**Longitude:** **122:23:30**
**Elevation:** **3300.00**
**Drainage Area:** **83.80**

14332000 SOUTH FORK ROGUE RIVER NEAR PROSPECT, OR
1985

LOCATION.--Lat 42 42'30", long 122 23'30", in SE1/4SW1/4 sec.7, T.33 S., R.4 E., Jackson County, Hydrologic Unit 17100307, in Rogue River National Forest on left bank 0.3 mi downstream from South Fork dam and intake of South Fork power canal, 0.31 mi downstream from Imnaha Creek, 5.6 mi southeast of Prospect, and at mile 10.2.

DRAINAGE AREA.--83.8 mi2. Area at site above Imnaha Creek used October 1931 to September 1949, 61.3 mi2, and Imnaha Creek near Prospect, 22.2 mi2.

PERIOD OF RECORD.--April 1924 to September 1931, October 1949 to current year. Equivalent records for period October 1931 to September 1949 may be obtained from combined flow of South Fork Rogue River above Imnaha Creek, near Prospect and Imnaha Creek near Prospect. Records since October 1983 equivalent to earlier records if South Fork Rogue River power canal diversion is added to flow past station.

REVISED RECORDS.--WSP 1318: 1925(M), 1927(M), 1930(M). WSP 1738: Drainage area.

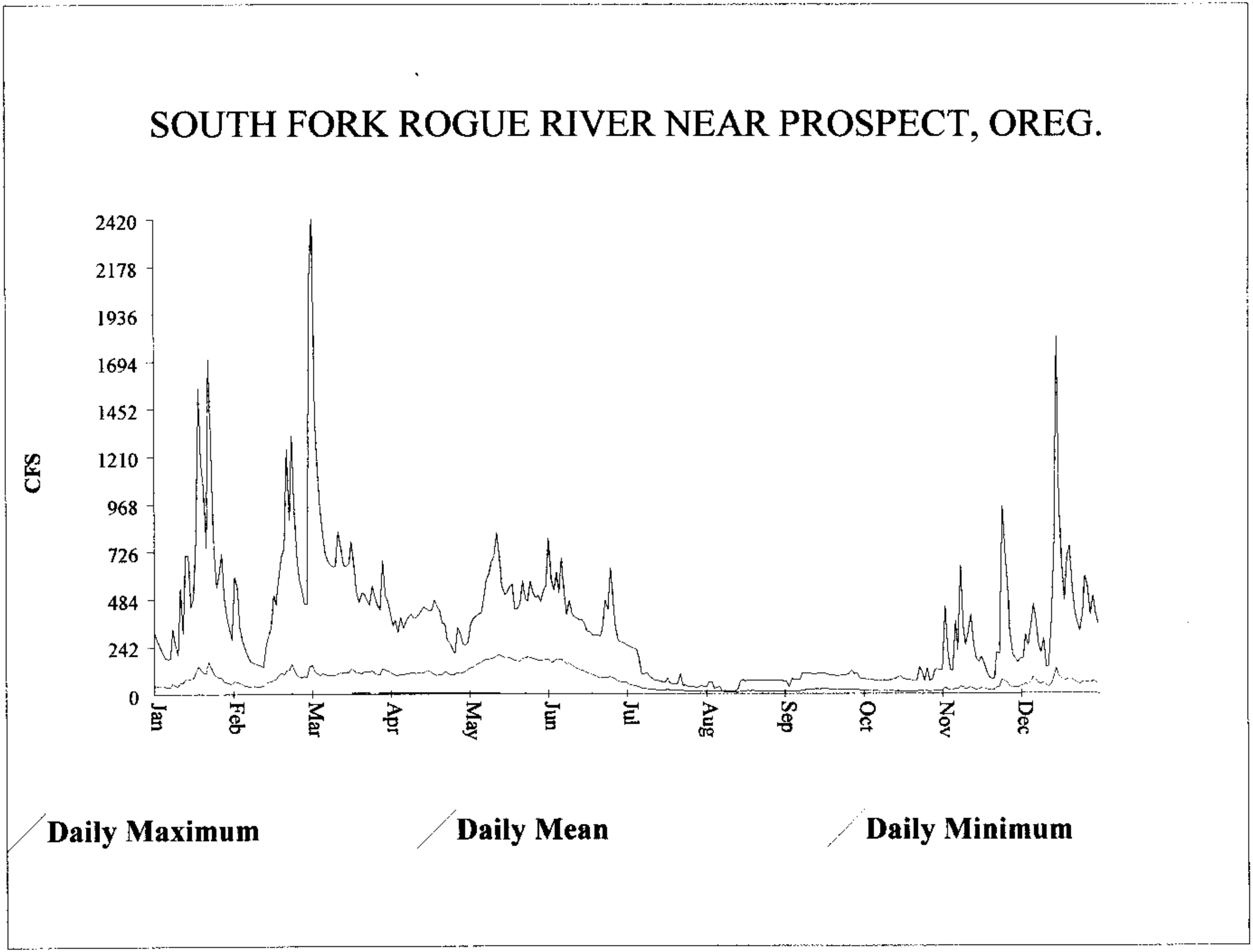
GAGE.--Water-stage recorder. Elevation of gage is 3,300 ft, from topographic map. Prior to Sept. 10, 1965, at site 1,000 ft upstream at different datum.

.MARKS.--Estimated daily discharges: Sept. 9-30. Records good except those for September, which are fair. All records given herein do not include flow in South Fork power canal (completed in March 1932) which diverts 1,500 ft upstream from station and returns water to Rogue River upstream from South Fork Rogue River; practically no storage upstream from diversion dam.

AVERAGE DISCHARGE.--59 years (water years 1925-83), 178 ft3/s, 129,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--River only, maximum discharge, 7,010 ft3/s Dec. 22, 1964, gage height, 11.1 ft, from floodmark, from rating curve extended above 410 ft3/s on basis of measurement of flow over dam of 3,180 ft3/s; no flow Jan. 31, 1950, Sept. 29, 30, 1967 (entire flow diverted to canal). Combined flow, maximum discharge, 7,010 ft3/s Dec. 22, 1964 (no flow in canal); minimum daily, about 38 ft3/s Aug. 1-31, 1931.

EXTREMES FOR CURRENT YEAR.--River only, maximum discharge, 392 ft3/s Apr. 15, gage height, 3.37 ft; minimum, 0.22 ft3/s Oct. 7, 8, 15-19.


SOUTH FORK ROGUE RIVER NEAR PROSPECT, OREG.
CFS
2420
2178
1936
1694
1452
1210
968
726
484
242
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Daily Maximum
Daily Mean
Daily Minimum

Station: **S FK ROGUE R AB IMNAHA CR NR PROSPECT OREG.**

ID: **14330500**

State: OREGON

County: JACKSON

Latitude: 42:42:00

Longitude: 122:23:00

Elevation: 3390.00

Drainage Area: 52.00

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1931 | 1949 | 19 | 6575 | 126.883 | 1920 | 27 |

## 14330500 SOUTH FORK ROGUE RIVER ABOVE IMNAHA CREEK, NEAR PROSPECT, OR

LOCATION.--Lat 42°42'25", long 122°23'20", in NE 1/4 sec.18, T.33 S., R.4 E., Jackson County, Hydrologic Unit 17100307, on left bank 900 ft upstream from Imnaha Creek, 1,200 ft upstream from South Fork diversion dam, and 6 mi southeast of Prospect.

DRAINAGE AREA.--52 $mi^2$.

PERIOD OF RECORD.--October 1931 to September 1949.

GAGE.--Water-stage recorder. Elevation of gage is 3,390 ft, from river-profile map.

REMARKS.--No diversion or regulation upstream from station.

AVERAGE DISCHARGE.--18 years, 127 $ft^3/s$, 92,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,170 $ft^3/s$ Dec. 1, 1942, gage height, 6.21 ft, from rating curve extended above 250 $ft^3/s$ on basis of former curve defined to 1,000 $ft^3/s$; minimum, 27 $ft^3/s$ Oct. 1-21, 1931.

### STATISTICAL SUMMARIES

[n = number of values used to compute statistics]

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW
BASED ON PERIOD OF RECORD 1933-1949

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL NON-EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 20<br>5% | 50<br>2% | 100<br>1% |
| 1 | 17 | 45 | 39 | 36 | 34 | -- | -- |
| 3 | 17 | 46 | 39 | 37 | 34 | -- | -- |
| 7 | 17 | 46 | 40 | 37 | 35 | -- | -- |
| 14 | 17 | 47 | 41 | 38 | 36 | -- | -- |
| 30 | 17 | 49 | 42 | 39 | 36 | -- | -- |
| 60 | 17 | 51 | 43 | 40 | 37 | -- | -- |
| 90 | 17 | 54 | 45 | 41 | 38 | -- | -- |
| 120 | 17 | 57 | 48 | 43 | 40 | -- | -- |
| 183 | 17 | 68 | 56 | 51 | 47 | -- | -- |

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW
BASED ON PERIOD OF RECORD 1932-1949

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 1 | 18 | 574 | 880 | 1130 | 1500 | -- | -- |
| 3 | 18 | 476 | 701 | 880 | 1140 | -- | -- |
| 7 | 18 | 404 | 564 | 679 | 836 | -- | -- |
| 15 | 18 | 353 | 478 | 558 | 658 | -- | -- |
| 30 | 18 | 320 | 424 | 483 | 551 | -- | -- |
| 60 | 18 | 280 | 366 | 413 | 462 | -- | -- |
| 90 | 18 | 242 | 311 | 349 | 389 | -- | -- |

MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW
BASED ON PERIOD OF RECORD 1932-1949

| DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | | |
|---|---|---|---|---|---|---|
| 1.25<br>80% | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 497 | 736 | 1110 | 1380 | 1750 | -- | -- |

Systematic n = 18 historical n = 0
Generalized 17b skew = 0.131

## 14330500 SOUTH FORK ROGUE RIVER ABOVE IMNAHA CREEK, NEAR PROSPECT, OR

LOCATION.--Lat 42°42'25", long 122°23'20", in NE 1/4 sec.18, T.33 S., R.4 E., Jackson County, Hydrologic Unit 17100307, on left bank 900 ft upstream from Imnaha Creek, 1,200 ft upstream from South Fork diversion dam, and 6 mi southeast of Prospect.

DRAINAGE AREA.--52 $mi^2$.

PERIOD OF RECORD.--October 1931 to September 1949.

GAGE.--Water-stage recorder. Elevation of gage is 3,390 ft, from river-profile map.

REMARKS.--No diversion or regulation upstream from station.

AVERAGE DISCHARGE.--18 years, 127 $ft^3/s$, 92,000 acre-ft/yr.

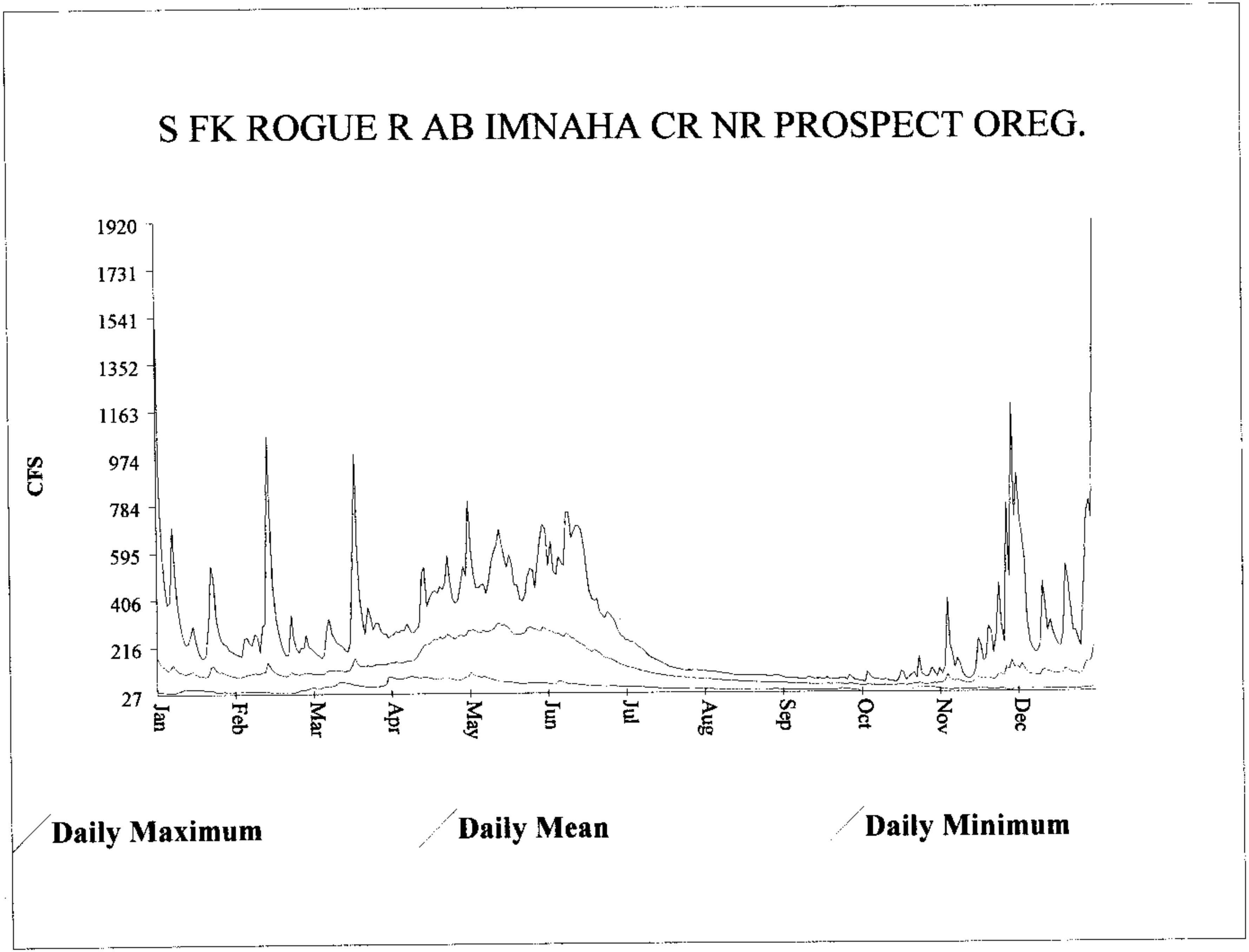
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,170 $ft^3/s$ Dec. 1, 1942, gage height, 6.21 ft, from rating curve extended above 250 $ft^3/s$ on basis of former curve defined to 1,000 $ft^3/s$; minimum, 27 $ft^3/s$ Oct. 1-21, 1931.

### STATISTICAL SUMMARIES FOR THE PERIOD 1932-1949

[n = number of values used to compute statistics; months are abbreviated; Ann = annual]

| Monthly and annual statistics based on mean daily discharge, in cubic feet per second | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | n | Minimum | (year) | Maximum | (year) | Mean | Standard deviation | Percent of annual runoff |
| Oct | 18 | 33 | 1932 | 77 | 1944 | 52 | 11 | 3.5 |
| Nov | 18 | 33 | 1932 | 193 | 1943 | 79 | 37 | 5.2 |
| Dec | 18 | 34 | 1932 | 325 | 1943 | 109 | 69 | 7.3 |
| Jan | 18 | 40 | 1932 | 319 | 1943 | 118 | 70 | 7.8 |
| Feb | 18 | 36 | 1932 | 241 | 1945 | 109 | 50 | 6.6 |
| Mar | 18 | 59 | 1937 | 220 | 1932 | 127 | 46 | 8.5 |
| Apr | 18 | 92 | 1941 | 303 | 1949 | 205 | 65 | 13.3 |
| May | 18 | 76 | 1934 | 489 | 1949 | 279 | 106 | 18.6 |
| Jun | 18 | 57 | 1934 | 490 | 1933 | 215 | 109 | 13.9 |
| Jul | 18 | 43 | 1934 | 161 | 1933 | 101 | 30 | 6.7 |
| Aug | 18 | 35 | 1934 | 100 | 1943 | 69 | 17 | 4.6 |
| Sep | 18 | 34 | 1934 | 80 | 1943 | 57 | 12 | 3.7 |
| Ann | | 75 | 1934 | 203 | 1943 | 127 | 31 | 100.0 |

| Flow duration statistics based on mean daily discharge | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Discharge, in cubic feet per second, which was equaled or exceeded for indicated percent of time | | | | | | | | | | | | | | |
| Month | 95 | 90 | 85 | 80 | 75 | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5 | (n) |
| Oct | 34 | 41 | 42 | 44 | 45 | 46 | 48 | 51 | 53 | 56 | 59 | 63 | 67 | 70 | 78 | 18 |
| Nov | 37 | 44 | 46 | 48 | 49 | 52 | 57 | 63 | 69 | 76 | 81 | 88 | 101 | 121 | 178 | 18 |
| Dec | 38 | 45 | 49 | 53 | 60 | 65 | 70 | 77 | 88 | 104 | 114 | 130 | 151 | 190 | 268 | 18 |
| Jan | 44 | 49 | 57 | 62 | 65 | 68 | 80 | 90 | 106 | 125 | 136 | 155 | 180 | 212 | 273 | 18 |
| Feb | 41 | 47 | 50 | 60 | 70 | 80 | 91 | 99 | 111 | 122 | 129 | 137 | 151 | 175 | 200 | 18 |
| Mar | 57 | 67 | 77 | 82 | 86 | 90 | 98 | 108 | 125 | 142 | 150 | 161 | 175 | 203 | 241 | 18 |
| Apr | 91 | 104 | 112 | 121 | 129 | 135 | 154 | 181 | 213 | 248 | 266 | 287 | 315 | 354 | 395 | 18 |
| May | 90 | 122 | 140 | 167 | 191 | 207 | 246 | 276 | 303 | 338 | 354 | 372 | 393 | 437 | 486 | 18 |
| Jun | 62 | 79 | 105 | 119 | 130 | 138 | 158 | 191 | 223 | 257 | 282 | 305 | 328 | 365 | 460 | 18 |
| Jul | 49 | 55 | 70 | 75 | 80 | 84 | 91 | 97 | 103 | 113 | 118 | 123 | 131 | 143 | 170 | 18 |
| Aug | 39 | 44 | 50 | 54 | 57 | 60 | 66 | 70 | 75 | 80 | 82 | 85 | 88 | 93 | 97 | 18 |
| Sep | 36 | 42 | 45 | 46 | 48 | 49 | 54 | 57 | 61 | 66 | 68 | 70 | 73 | 76 | 79 | 18 |
| Ann | 41 | 46 | 50 | 55 | 60 | 65 | 76 | 89 | 106 | 132 | 149 | 179 | 218 | 270 | 344 | |


S FK ROGUE R AB IMNAHA CR NR PROSPECT OREG.
CFS
1920
1731
1541
1352
1163
974
784
595
406
216
27
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Daily Maximum
Daily Mean
Daily Minimum

Station: **MIDDLE FK ROGUE RIVER NR PROSPECT OREG.**

ID: **14333000**

State: OREGON

County: JACKSON

Latitude: 42:44:00

Longitude: 122:24:00

Elevation: 2619.00

Drainage Area: 56.50

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1925 | 1955 | 31 | 10957 | 184.335 | 1700 | 72 |

## 14333000 MIDDLE FORK ROGUE RIVER NEAR PROSPECT, OR

LOCATION.--Lat 42°44'05", long 122°24'05", in NE 1/4 NE 1/4 sec.1, T.33 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 850 ft downstream from diversion dam and intake of Middle Fork power canal, and 4.5 mi southeast of Prospect.

DRAINAGE AREA.--56.5 $mi^2$.

PERIOD OF RECORD.--May 1925 to September 1955 (includes flow of Middle Fork power canal since completion Nov. 19, 1931).

GAGE.--Water-stage recorder. Datum of gage is 2,619 ft above National Geodetic Vertical Datum of 1929 (levels by the California-Oregon Power Co.). Prior to Nov. 10, 1949, water-stage recorder and staff gage at various sites and datums within 150 ft of present gage.

REMARKS.--All records given herein include flow in Middle Fork power canal which diverts 850 ft upstream from station for hydroelectric power and returns water to the Rogue River above South Fork Rogue River; practically no storage upstream from diversion dam.

AVERAGE DISCHARGE.--30 years (water years 1926-55), 184 $ft^3/s$, 133,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,120 $ft^3/s$ Nov. 23, 1953, from rating curve extended above 250 ft on basis of shape of previous rating curves; minimum daily, 72 $ft^3/s$ Aug. 24, to Sept. 5, 1931.

### STATISTICAL SUMMARIES

[n = number of values used to compute statistics]

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW
BASED ON PERIOD OF RECORD 1934-1955

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL NON-EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 50% | 5 20% | 10 10% | 20 5% | 50 2% | 100 1% |
| 1 | 22 | 111 | 98 | 92 | 88 | 83 | -- |
| 3 | 22 | 112 | 99 | 94 | 90 | 86 | -- |
| 7 | 22 | 113 | 101 | 95 | 92 | 88 | -- |
| 14 | 22 | 114 | 102 | 96 | 92 | 88 | -- |
| 30 | 22 | 116 | 103 | 98 | 94 | 90 | -- |
| 60 | 22 | 119 | 106 | 100 | 95 | 90 | -- |
| 90 | 22 | 122 | 108 | 102 | 97 | 92 | -- |
| 120 | 22 | 125 | 110 | 104 | 99 | 94 | -- |
| 183 | 22 | 137 | 119 | 112 | 108 | 103 | -- |

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW
BASED ON PERIOD OF RECORD 1933-1955

| PERIOD (CON-SECU-TIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2 50% | 5 20% | 10 10% | 25 4% | 50 2% | 100 1% |
| 1 | 23 | 666 | 1020 | 1310 | 1730 | 2100 | -- |
| 3 | 23 | 557 | 779 | 940 | 1160 | 1330 | -- |
| 7 | 23 | 458 | 597 | 692 | 816 | 910 | -- |
| 15 | 23 | 385 | 475 | 532 | 602 | 652 | -- |
| 30 | 23 | 345 | 419 | 462 | 513 | 548 | -- |
| 60 | 23 | 314 | 366 | 390 | 413 | 427 | -- |
| 90 | 23 | 289 | 334 | 356 | 378 | 391 | -- |

MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW
BASED ON PERIOD OF RECORD 1933-1956

| DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | | |
|---|---|---|---|---|---|---|
| 1.25 80% | 2 50% | 5 20% | 10 10% | 25 4% | 50 2% | 100 1% |
| 558 | 915 | 1600 | 2210 | 3170 | 4050 | -- |

Systematic n = 24 historical n = 0
Weighted skew = 0.435

## 14333000 MIDDLE FORK ROGUE RIVER NEAR PROSPECT, OR

LOCATION.--Lat 42°44'05", long 122°24'05", in NE 1/4 NE 1/4 sec.1, T.33 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 850 ft downstream from diversion dam and intake of Middle Fork power canal, and 4.5 mi southeast of Prospect.

DRAINAGE AREA.--56.5 $mi^2$.

PERIOD OF RECORD.--May 1925 to September 1955 (includes flow of Middle Fork power canal since completion Nov. 19, 1931).

GAGE.--Water-stage recorder. Datum of gage is 2,619 ft above National Geodetic Vertical Datum of 1929 (levels by the California-Oregon Power Co.). Prior to Nov. 10, 1949, water-stage recorder and staff gage at various sites and datums within 150 ft of present gage.

REMARKS.--All records given herein include flow in Middle Fork power canal which diverts 850 ft upstream from station for hydroelectric power and returns water to the Rogue River above South Fork Rogue River; practically no storage upstream from diversion dam.

AVERAGE DISCHARGE.--30 years (water years 1926-55), 184 $ft^3/s$, 133,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,120 $ft^3/s$ Nov. 23, 1953, from rating curve extended above 250 ft on basis of shape of previous rating curves; minimum daily, 72 $ft^3/s$ Aug. 24, to Sept. 5, 1931.

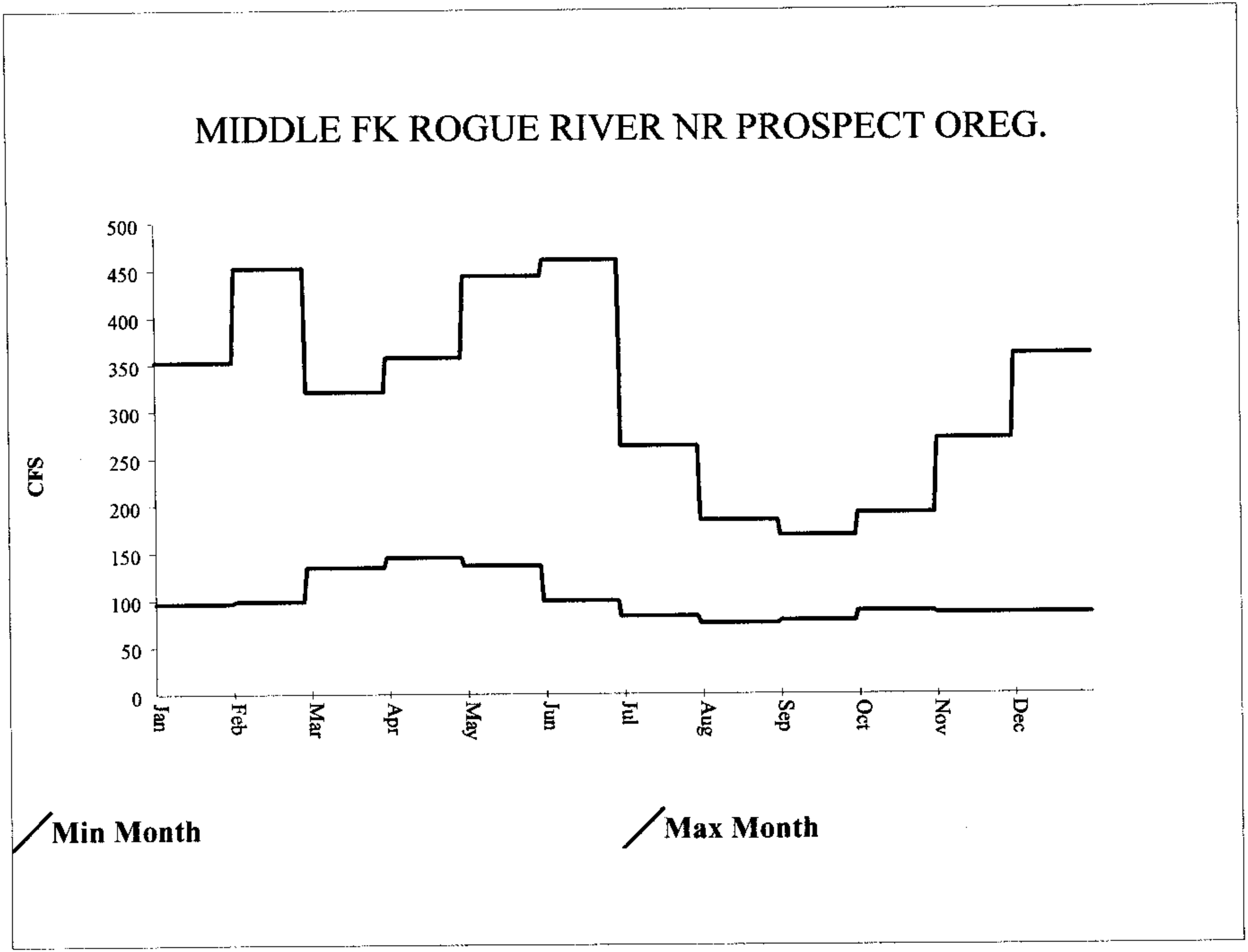
### STATISTICAL SUMMARIES FOR THE PERIOD 1933-1955

[n = number of values used to compute statistics; months are abbreviated; Ann = annual]

| Monthly and annual statistics based on mean daily discharge, in cubic feet per second | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Month | n | Minimum | (year) | Maximum | (year) | Mean | Standard deviation | Percent of annual runoff |
| Oct | 23 | 100 | 1943 | 191 | 1952 | 129 | 25 | 5.7 |
| Nov | 23 | 107 | 1940 | 270 | 1954 | 158 | 46 | 6.7 |
| Dec | 23 | 112 | 1945 | 359 | 1951 | 189 | 73 | 8.3 |
| Jan | 23 | 104 | 1937 | 352 | 1953 | 194 | 64 | 8.5 |
| Feb | 23 | 103 | 1937 | 451 | 1951 | 205 | 85 | 8.2 |
| Mar | 23 | 134 | 1933 | 259 | 1933 | 189 | 36 | 8.3 |
| Apr | 23 | 145 | 1933 | 357 | 1933 | 254 | 53 | 10.8 |
| May | 23 | 139 | 1933 | 443 | 1933 | 296 | 63 | 13.0 |
| Jun | 23 | 114 | 1933 | 460 | 1933 | 270 | 81 | 11.5 |
| Jul | 23 | 102 | 1933 | 263 | 1933 | 168 | 38 | 7.4 |
| Aug | 23 | 95 | 1933 | 184 | 1933 | 135 | 22 | 5.9 |
| Sep | 23 | 90 | 1933 | 168 | 1933 | 126 | 19 | 5.4 |
| Ann | | 137 | 1934 | 250 | 1951 | 193 | 33 | 100.0 |

Flow duration statistics based on mean daily discharge

| Month | Discharge, in cubic feet per second, which was equaled or exceeded for indicated percent of time | | | | | | | | | | | | | | (n) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 95 | 90 | 85 | 80 | 75 | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5 | |
| Oct | 97 | 101 | 104 | 106 | 109 | 111 | 115 | 121 | 127 | 135 | 140 | 147 | 154 | 161 | 176 | 23 |
| Nov | 106 | 109 | 111 | 114 | 117 | 120 | 127 | 135 | 144 | 153 | 161 | 169 | 185 | 221 | 289 | 23 |
| Dec | 108 | 113 | 120 | 125 | 130 | 133 | 140 | 148 | 159 | 183 | 198 | 232 | 261 | 300 | 386 | 23 |
| Jan | 112 | 122 | 126 | 130 | 134 | 137 | 146 | 164 | 180 | 202 | 215 | 230 | 251 | 285 | 362 | 23 |
| Feb | 112 | 124 | 133 | 137 | 142 | 148 | 160 | 172 | 190 | 211 | 224 | 243 | 270 | 307 | 356 | 23 |
| Mar | 128 | 133 | 137 | 141 | 152 | 159 | 171 | 184 | 192 | 205 | 215 | 222 | 236 | 260 | 295 | 23 |
| Apr | 151 | 170 | 179 | 186 | 192 | 200 | 219 | 242 | 269 | 291 | 305 | 319 | 335 | 356 | 392 | 23 |
| May | 165 | 196 | 214 | 225 | 240 | 250 | 271 | 291 | 316 | 336 | 347 | 359 | 375 | 397 | 433 | 23 |
| Jun | 121 | 157 | 176 | 194 | 210 | 222 | 239 | 258 | 279 | 309 | 323 | 343 | 365 | 393 | 439 | 23 |
| Jul | 107 | 116 | 130 | 135 | 140 | 144 | 154 | 161 | 170 | 179 | 185 | 195 | 208 | 226 | 267 | 23 |
| Aug | 99 | 106 | 112 | 117 | 120 | 121 | 127 | 133 | 139 | 146 | 152 | 156 | 159 | 163 | 174 | 23 |
| Sep | 98 | 102 | 107 | 109 | 112 | 114 | 118 | 125 | 129 | 135 | 138 | 142 | 147 | 155 | 166 | 23 |
| Ann | 104 | 112 | 118 | 124 | 129 | 134 | 145 | 161 | 180 | 210 | 229 | 253 | 282 | 315 | 367 | |



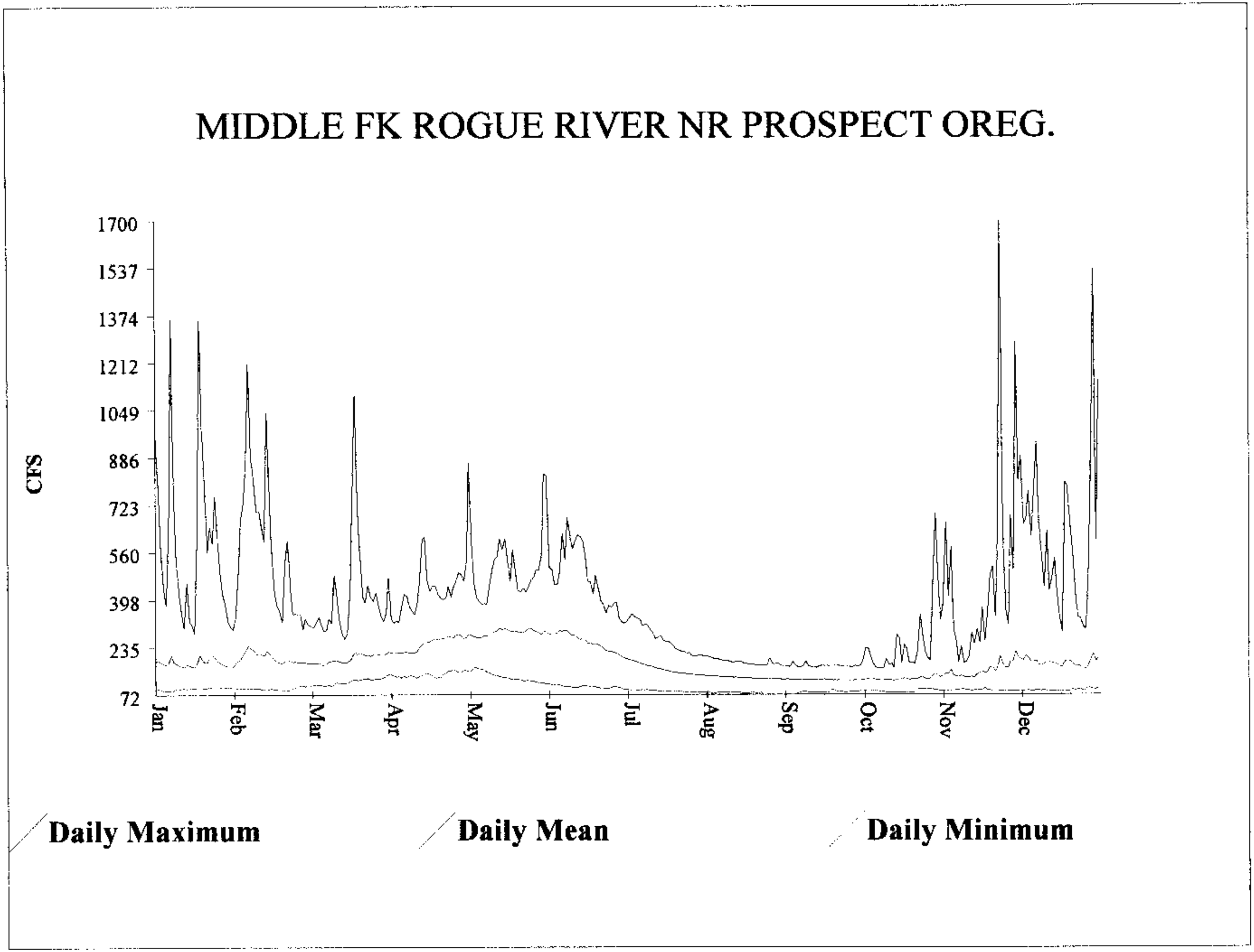
MIDDLE FK ROGUE RIVER NR PROSPECT OREG.
CFS
500
450
400
350
300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Min Month
Max Month

Station: **MIDDLE FK ROGUE RIVER NR PROSPECT OREG.**
rameter: Streamflow (cfs)
Year: 1925-1955
State: OREGON
County: JACKSON

ID: 14333000
Statistic: Mean
Latitude: 42:44:00
Longitude: 122:24:00
Elevation: 2619.00
Drainage Area: 56.50

**Monthly Statistics**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Ann |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **# Days** | 930 | 847 | 930 | 900 | 930 | 900 | 930 | 930 | 900 | 930 | 900 | 930 | 10957 |
| **Avg Day** | 180.3 | 197.8 | 192.9 | 242.2 | 283.1 | 254.0 | 159.5 | 128.1 | 120.4 | 123.9 | 153.0 | 179.0 | 184.3 |
| **Max Day** | 1360 | 1210 | 1100 | 616.0 | 869.0 | 823.0 | 350.0 | 203.0 | 187.0 | 695.0 | 1700 | 1530 | 1700 |
| **Min Day** | 84.00 | 87.00 | 101.0 | 127.0 | 109.0 | 91.00 | 76.00 | 72.00 | 72.00 | 77.00 | 82.00 | 81.00 | 72.00 |
| **# Months** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SDev Month** | 64.96 | 83.97 | 44.76 | 54.28 | 72.98 | 89.53 | 41.73 | 24.51 | 21.16 | 25.37 | 48.19 | 69.54 | 35.93 |
| **Skew Month** | 0.930 | 1.45 | 0.885 | 0.023 | -0.436 | 0.039 | 0.324 | 0.044 | 0.310 | 1.22 | 1.06 | 1.16 | 0.120 |
| **Min Month** | 96.35 | 98.43 | 134.2 | 144.5 | 136.3 | 98.87 | 82.39 | 74.58 | 77.70 | 87.68 | 85.43 | 85.10 | 110.0 |
| **Max Month** | 352.1 | 451.4 | 320.5 | 356.8 | 443.5 | 460.3 | 262.5 | 184.1 | 168.0 | 191.5 | 270.1 | 359.5 | 249.8 |
| **Exceedences** | | | | | | | | | | | | | |
| **1%** | 638.9 | 786.9 | 420.8 | 454.0 | 546.5 | 572.0 | 323.5 | 190.0 | 170.0 | 257.6 | 578.0 | 736.5 | 503.4 |
| **5%** | 323.0 | 351.3 | 314.0 | 382.0 | 429.0 | 426.0 | 251.0 | 170.0 | 164.0 | 167.5 | 280.0 | 355.0 | 358.0 |
| **10%** | 262.0 | 308.9 | 271.0 | 342.0 | 390.0 | 382.0 | 217.0 | 160.0 | 150.0 | 155.0 | 222.0 | 288.0 | 308.0 |
| **20%** | 221.0 | 240.0 | 224.0 | 306.0 | 352.0 | 334.0 | 188.0 | 150.0 | 137.0 | 139.0 | 166.0 | 210.0 | 242.0 |
| **50%** | 149.0 | 168.0 | 183.0 | 230.0 | 282.0 | 245.0 | 155.0 | 126.0 | 118.0 | 117.0 | 130.0 | 144.0 | 154.0 |
| **80%** | 123.0 | 132.0 | 140.0 | 176.0 | 208.0 | 165.0 | 122.0 | 108.0 | 103.0 | 103.0 | 109.0 | 117.0 | 117.0 |
| **90%** | 108.0 | 105.0 | 131.0 | 155.0 | 160.0 | 117.0 | 103.0 | 96.00 | 94.00 | 97.00 | 100.0 | 107.0 | 105.0 |
| **95%** | 99.00 | 100.0 | 124.0 | 145.0 | 133.0 | 105.0 | 91.00 | 88.00 | 86.00 | 91.00 | 95.00 | 97.00 | 97.00 |
| **99%** | 91.00 | 90.00 | 105.0 | 133.0 | 116.3 | 95.00 | 80.00 | 74.00 | 76.00 | 78.00 | 84.00 | 83.00 | 83.00 |


MIDDLE FK ROGUE RIVER NR PROSPECT OREG.
1700
1537
1374
1212
1049
886
723
560
398
235
72
CFS
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Daily Maximum
Daily Mean
Daily Minimum

Station: **RED BLANKET CREEK NEAR PROSPECT, OREG.**
ID: **14333500**
State: OREGON
County: JACKSON

Latitude: 42:46:40
Longitude: 122:25:35
Elevation: 2780.00
Drainage Area: 45.50

| Parameter | Statistic | S. Yr | E. Yr | # Yrs | # Obs | Avg | Max | Min |
|---|---|---|---|---|---|---|---|---|
| STREAM FLOW CFS | Mean | 1925 | 1981 | 57 | 18180 | 117.811 | 2220 | 34 |

## 14333500 RED BLANKET CREEK NEAR PROSPECT, OR

LOCATION.--Lat 42°46'40", long 122°25'35", in NW 1/4 NE 1/4 sec.23, T.32 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 1.8 mi downstream from Lick Creek, 3.7 mi northeast of Prospect, and at mile 4.8.

DRAINAGE AREA.--45.5 $mi^2$.

PERIOD OF RECORD.--May 1925 to September 1981.

GAGE.--Water-stage recorder. Elevation of gage is 2,780 ft, from river-profile map. Prior to Sept. 7, 1949, nonrecording gage at several sites within 2.5 mi of present site at various datums.

REMARKS.--No regulation. Small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--56 years (water years 1926-81), 115 $ft^3/s$, 83,320 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,190 $ft^3/s$ Dec. 22, 1964, gage height, 7.85 ft, from rating curve extended above 1,500 $ft^3/s$; minimum observed, 34 $ft^3/s$ Sept. 3, 4, 25, Oct. 9, 16, 1931.

### STATISTICAL SUMMARIES

[n = number of values used to compute statistics]

MAGNITUDE AND PROBABILITY OF ANNUAL LOW FLOW
BASED ON PERIOD OF RECORD 1935-1981

| PERIOD (CONSECUTIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL NON-EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 20<br>5% | 50<br>2% | 100<br>1% |
| 1 | 47 | 56 | 47 | 43 | 40 | 37 | 35 |
| 3 | 47 | 57 | 48 | 43 | 40 | 37 | 35 |
| 7 | 47 | 58 | 49 | 45 | 41 | 38 | 36 |
| 14 | 47 | 59 | 50 | 46 | 42 | 39 | 37 |
| 30 | 47 | 61 | 51 | 47 | 44 | 40 | 38 |
| 60 | 47 | 63 | 53 | 49 | 45 | 42 | 40 |
| 90 | 47 | 66 | 55 | 51 | 47 | 44 | 42 |
| 120 | 47 | 68 | 58 | 53 | 49 | 46 | 43 |
| 183 | 47 | 80 | 66 | 60 | 56 | 52 | 49 |

MAGNITUDE AND PROBABILITY OF ANNUAL HIGH FLOW
BASED ON PERIOD OF RECORD 1934-1981

| PERIOD (CONSECUTIVE DAYS) | n | DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 1 | 48 | 465 | 784 | 1050 | 1470 | 1840 | 2260 |
| 3 | 48 | 376 | 608 | 808 | 1120 | 1410 | 1740 |
| 7 | 48 | 299 | 447 | 568 | 752 | 913 | 1100 |
| 15 | 48 | 249 | 344 | 413 | 507 | 583 | 664 |
| 30 | 48 | 220 | 288 | 331 | 384 | 423 | 461 |
| 60 | 48 | 192 | 247 | 281 | 321 | 349 | 377 |
| 90 | 48 | 175 | 220 | 247 | 279 | 300 | 320 |

MAGNITUDE AND PROBABILITY OF INSTANTANEOUS PEAK FLOW
BASED ON PERIOD OF RECORD 1927-1981

| DISCHARGE, IN $FT^3/S$, FOR INDICATED RECURRENCE INTERVAL, IN YEARS, AND ANNUAL EXCEEDANCE PROBABILITY, IN PERCENT | | | | | | |
|---|---|---|---|---|---|---|
| 1.25<br>80% | 2<br>50% | 5<br>20% | 10<br>10% | 25<br>4% | 50<br>2% | 100<br>1% |
| 327 | 560 | 993 | 1360 | 1910 | 2400 | 2960 |

Systematic n = 55 historical n = 0
Weighted skew = 0.215

## 14333500 RED BLANKET CREEK NEAR PROSPECT, OR

LOCATION.--Lat 42°46'40", long 122°25'35", in NW 1/4 NE 1/4 sec.23, T.32 S., R.3 E., Jackson County, Hydrologic Unit 17100307, on right bank 1.8 mi downstream from Lick Creek, 3.7 mi northeast of Prospect, and at mile 4.8.

DRAINAGE AREA.--45.5 mi$^2$.

PERIOD OF RECORD.--May 1925 to September 1981.

GAGE.--Water-stage recorder. Elevation of gage is 2,780 ft, from river-profile map. Prior to Sept. 7, 1949, nonrecording gage at several sites within 2.5 mi of present site at various datums.

REMARKS.--No regulation. Small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--56 years (water years 1926-81), 115 ft$^3$/s, 83,320 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,190 ft$^3$/s Dec. 22, 1964, gage height, 7.85 ft, from rating curve extended above 1,500 ft$^3$/s; minimum observed, 34 ft$^3$/s Sept. 3, 4, 25, Oct. 9, 16, 1931.

### STATISTICAL SUMMARIES FOR THE PERIOD 1925-1981

[n = number of values used to compute statistics; months are abbreviated; Ann = annual]

Monthly and annual statistics based on mean daily discharge, in cubic feet per second

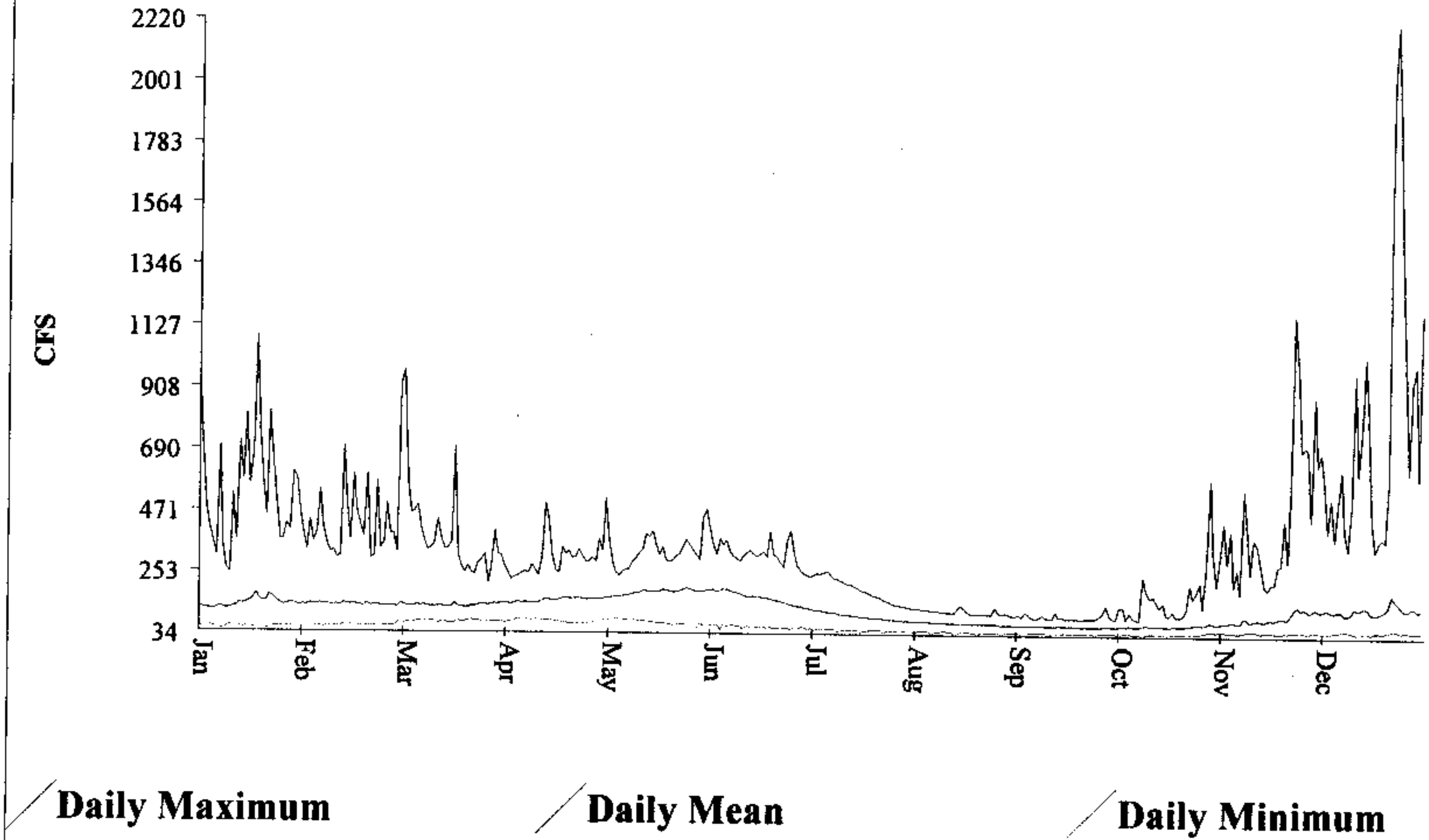
| Month | n | Minimum | (year) | Maximum | (year) | Mean | Standard deviation | Percent of annual runoff |
|---|---|---|---|---|---|---|---|---|
| Oct | 49 | 47 | 1981 | 117 | 1951 | 70 | 16 | 5.0 |
| Nov | 51 | 50 | 1937 | 207 | 1943 | 102 | 38 | 7.1 |
| Dec | 50 | 54 | 1937 | 482 | 1965 | 132 | 78 | 9.5 |
| Jan | 49 | 48 | 1937 | 279 | 1956 | 133 | 57 | 9.6 |
| Feb | 49 | 54 | 1937 | 265 | 1958 | 130 | 44 | 8.5 |
| Mar | 48 | 72 | 1977 | 354 | 1972 | 127 | 48 | 9.1 |
| Apr | 48 | 74 | 1968 | 227 | 1952 | 146 | 38 | 10.2 |
| May | 48 | 75 | 1934 | 285 | 1949 | 178 | 50 | 12.8 |
| Jun | 48 | 58 | 1934 | 274 | 1974 | 164 | 60 | 11.4 |
| Jul | 48 | 49 | 1934 | 198 | 1953 | 98 | 33 | 7.1 |
| Aug | 48 | 42 | 1934 | 117 | 1953 | 74 | 19 | 5.3 |
| Sep | 48 | 40 | 1934 | 97 | 1958 | 66 | 14 | 4.6 |
| Ann | | 71 | 1977 | 177 | 1943 | 118 | 28 | 100.0 |

Flow duration statistics based on mean daily discharge

Discharge, in cubic feet per second, which was equaled or exceeded for indicated percent of time

| Month | 95 | 90 | 85 | 80 | 75 | 70 | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5 | (n) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct | 48 | 52 | 53 | 55 | 57 | 59 | 62 | 66 | 71 | 77 | 80 | 83 | 86 | 91 | 100 | 49 |
| Nov | 53 | 58 | 60 | 63 | 66 | 69 | 75 | 80 | 87 | 99 | 108 | 120 | 135 | 164 | 218 | 51 |
| Dec | 59 | 64 | 68 | 72 | 75 | 79 | 87 | 96 | 112 | 131 | 145 | 165 | 183 | 209 | 281 | 50 |
| Jan | 62 | 69 | 74 | 79 | 83 | 86 | 95 | 105 | 118 | 137 | 148 | 164 | 183 | 217 | 284 | 49 |
| Feb | 67 | 78 | 82 | 87 | 91 | 96 | 105 | 114 | 126 | 141 | 150 | 161 | 173 | 191 | 241 | 49 |
| Mar | 76 | 80 | 85 | 91 | 96 | 100 | 107 | 114 | 123 | 135 | 142 | 149 | 161 | 188 | 223 | 48 |
| Apr | 83 | 91 | 97 | 103 | 109 | 115 | 126 | 138 | 150 | 168 | 177 | 185 | 197 | 215 | 239 | 48 |
| May | 91 | 107 | 118 | 127 | 134 | 142 | 159 | 173 | 187 | 204 | 215 | 227 | 243 | 261 | 289 | 48 |
| Jun | 71 | 88 | 94 | 101 | 108 | 116 | 137 | 156 | 176 | 198 | 211 | 223 | 239 | 261 | 288 | 48 |
| Jul | 54 | 60 | 66 | 71 | 74 | 77 | 83 | 89 | 97 | 109 | 117 | 125 | 136 | 148 | 177 | 48 |
| Aug | 48 | 52 | 56 | 58 | 60 | 62 | 66 | 70 | 76 | 83 | 86 | 93 | 100 | 105 | 112 | 48 |
| Sep | 45 | 48 | 52 | 54 | 56 | 58 | 61 | 64 | 68 | 73 | 77 | 81 | 86 | 91 | 96 | 48 |
| Ann | 53 | 58 | 63 | 68 | 72 | 77 | 86 | 97 | 111 | 130 | 144 | 159 | 178 | 202 | 243 | |

# RED BLANKET CREEK NEAR PROSPECT, OREG.



# APPENDIX J
# RECREATION INPUT
# FORKS WATERSHED

**CASCADE ZONE**
**ROGUE RIVER NATIONAL FOREST**
**1997**

## Recreation, Trails, and Wilderness Group

# RECREATION INPUT SHEET For FORKS WATERSHED ANALYSIS PROJECT

## I. DATA (Maps Attached)

### A. Developed Recreation Sites:

There are three developed recreation sites within the Analysis Area. However, an additional three developed recreation sites have been abandoned and allowed to transgress into dispersed camping areas over the last 10 years. These were: Sumpter Campground; Nichols Creek Picnic Area; and Big Ben Campground. These were abandoned for several reasons, low use, funding, logging activities within the site because of disease, and changing visitation patterns. The three remaining sites are:

Imnaha Campground - (T.33S.,R4E.,Sec.15) The campground is located off of Forest Road 3700. There are 4 campsites at this non-fee site, each with a fire-ring and picnic table. There is no water system within the campground, however, potable water is available at the Imnaha Guard Station (see Recreation Special Uses) from a spigot. Calculated use in 1995 was 835 visits which equates to 125 Recreation Visitor Days (RVD's) for the recreation activity "camping." These visits represent a 39% occupancy rate for a 172 day season. Based on the Rogue River National Forest's Final Environmental Impact Statement's (FEIS) definition for "Level of Use" for developed recreation sites, Imnaha receives "moderate" use (ie. Meets capacity on holidays, and nears capacity on weekends).

South Fork Campground - (T.34S.,R4E.,Sec.3) The campground is located off of Forest Road 3400. There are 6 campsites at this fee site, each with a fire-ring and picnic table. The water system consists of one well with a hand-pump. Calculated use in 1995 was 372 visits which equates to 56 RVD's for the recreation activity "camping." These visits represent a 12% occupancy rate for a 141 day season. Based on the Rogue River National Forest's FEIS definition for "Level of Use" for developed recreation sites, South Fork receives "low" use (ie. Nears capacity on holidays).

Parker Meadows Campground - (T.34S.,R4E.,Sec.22) The campground is located off of Forest Road 3700. There are 9 campsites at this fee site, each with a fire-ring and picnic table. The water system consists of one well with a hand-pump. Calculated use in 1995 was 397 visits which equates to 60 RVD's for the recreation activity "camping." These visits represent a 11% occupancy rate for a 141 day season. Based on the Rogue River National Forest's FEIS definition for "Level of Use" for developed recreation sites, South Fork receives "low" use (ie. Nears capacity on holidays).

## I. DATA - Continued

### B. Dispersed Campsites/Forest Camps:

There are 41 recorded dispersed campsites within the analysis area. To date, very little information is known on their level of use. It is estimated that only 15% of the campsites receive moderate to high use Use levels are based on the FEIS definitions for dispersed recreation sites: low - 50 visits or less; moderate - 51 to 150 visits; and high - 151 visits or more. The majority of these campsites are utilized for short periods during deer or elk hunting seasons. See the attached maps for specific locations.

### C. Trails:

There are 30 maintained trails within the analysis area, totaling approximately 111 miles. Six of these trails are non-wilderness, and the remainder are wilderness trails that are either primary access trails into Sky Lakes Wilderness, or trails within the interior of the wilderness. Also, there are several trails, or portions of trails within the analysis area that have been abandoned over the last decade. For example, Lucky Camp, Hemlock Lake, and Wickiup. Elevation change is shown as the difference between termini, and may not represent the actual steepness of the trail. Use for the remaining trails is only estimated because of the lack of good information. Use levels are based on the FEIS definitions for trails: low - 50 visits or less; moderate - 51 to 150 visits; and high - 151 visits or more; and an educated guess by a local employee.

#### 1. Summer Opportunities

Meadow Lake Trail - #976: The trail is an interior wilderness trail that is 1.0 miles in length and provides a "most difficult" type of experience for horses and hikers. The trail connects with Cat Hill Way and Blue Canyon trails. Elevation change is approximately 640 feet. Estimated use is moderate.

Middle Fork Trail - #978: The trail is a primary wilderness access trail that is 8.5 miles in length and provides a "most difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3790. The trail connects with the Seven Lakes Trail. Elevation change is approximately 2,580 feet. Estimated use is moderate.

Alta Lake Trail - #979: The trail is a primary wilderness access trail that is 6.2 miles in length and provides a "most difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3785. The trail connects with the Seven Lakes Trail. Elevation change is approximately 2,000 feet. Estimated use is moderate.

King Spruce Trail - #980: The trail is an interior wilderness trail that is 5.1 miles in length and provides a "more difficult" type of experience for hikers. The trail connects with Seven Lakes and Alta Lake trails. Elevation change is approximately 740 feet. Estimated use is moderate.

I. DATA - Continued

C. Trails:

1. Summer Opportunities - Continued

Seven Lakes Trail - #981: The trail is a primary wilderness access trail that is 6.1 miles in length and provides a "most difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3780. The trail connects with the Pacific Crest National Scenic Trail. Elevation change is approximately 840 feet. However, the trail climbs 1,600 feet in the first four miles before descending 760 feet to the Pacific Crest Trail. Estimated use is high.

Blue Canyon Trail - #982: The trail is a primary wilderness access trail that is 5.1 miles in length and provides a "more difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3770. The trail connects with the Pacific Crest National Scenic Trail. Elevation change is approximately 280 feet. Estimated use is high.

Cliff Lake Trail - #983: The trail is an interior wilderness trail that is 0.3 miles in length and provides a "more difficult" type of experience for hikers and horses. The trail connects with Seven Lakes and Pacific Crest trails. Elevation change is approximately 80 feet. Estimated use is high.

Devils Peak Trail - #984: The trail is an interior wilderness trail that is 1.2 miles in length and provides a "most difficult" type of experience for hikers and horses. The trail connects with Seven Lakes and Pacific Crest trails. Elevation change is approximately 360 feet. Estimated use is high.

South Fork Trail, Non-Wilderness - #986: The trail follows the shoreline of the South Fork of the Rogue River and is 11.3 miles in length and provides an "easiest" type of experience for hikers and mountain bikers. There are three trail heads located on Forest Roads 37, 34, and 34-400 respectively. Elevation change is approximately 960 feet. Estimated use is low.

Red Lake Trail - #987: The trail is an interior wilderness trail that is 3.5 miles in length and provides a "more difficult" type of experience for hikers and horses. The trail connects with Blue Canyon and Pacific Crest trails. Elevation change is approximately 40 feet. Estimated use is moderate.

South Fork Trail, Wilderness - #988: The primary access trail follows the shoreline of the South Fork of the Rogue River into Sky Lakes and is 5.1 miles in length and provides a "most difficult" type of experience for hikers. The trailhead is located on Forest Road 37. Elevation change is approximately 1,040 feet. Estimated use is low.

Cat Hill Way Trail - #992: The trail is a wilderness access trail that is 4.4 miles in length and provides a "more difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3770 and shares the primary access with the Blue Canyon Trail. The trail connects with the Pacific Crest National Scenic Trail. Elevation change is approximately 60 feet. Estimated use is moderate.

I. DATA - Continued

C. Trails:

1. Summer Opportunities - Continued

Lake Ivern Trail - #994: The trail is an interior wilderness trail that is 1.8 miles in length and provides a "more difficult" type of experience for hikers and horses. The trail connects with the Seven Lakes Trail. Elevation change is approximately 560 feet. Estimated use is high.

Bigfoot Springs Trail - #999: The trail is an interior wilderness trail that is 0.3 miles in length and provides a "more difficult" type of experience for hikers. The trail connects with the Lake Ivern Trail. Elevation change is approximately 40 feet. Estimated use is high.

Varmint Camp Trail, Non-Wilderness - #1070: The trail is 3.1 miles in length and provides a "most difficult" type of experience for motorcycles, horses, hikers, and mountain bikers. There are two trail heads located on Forest Roads 6215-830 and 6205 respectively. Elevation change is approximately 1,740 feet. Estimated use is low.

Cold Springs Trail, Non-Wilderness - #1073: The trail is 2.6 miles in length and provides an "easiest" type of experience for quads, motorcycles, horses, hikers, and mountain bikers. The trailhead is located on Forest Road 6205-100. Elevation change is approximately 280 feet. Estimated use is low.

Middle Fork Basin Trail - #1077: The trail is an interior wilderness trail that is 0.8 miles in length and provides a "more difficult" type of experience for hikers and horses. Estimated use is low.

Stuart Falls Trail - #1078: The trail is an interior wilderness trail that is 6.5 miles in length (2.0 miles is within Crater Lake National Park) and provides a "more difficult" type of experience for hikers. The trail connects at both ends with the Pacific Crest National Scenic Trail. Elevation change is approximately 150 feet. However, the lowest point is 600 feet below either end. Estimated use is high.

Lucky Camp Trail - #1083: The trail is an interior wilderness trail that is 1.5 miles in length and provides a "most difficult" type of experience for hikers and horses. The trail connects with Red Blanket Falls and Stuart Falls trails. A portion of this trail that acted as a wilderness access was abandoned because of its parallel nature with the Tom and Jerry Trail. Elevation change is approximately 280 feet. Estimated use is high.

Tom and Jerry Trail - #1084: The trail is a primary wilderness access trail that is 5.0 miles in length and provides a "most difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 3795-600. The trail connects with McKie Camp and Mudjekeewis trails. Elevation change is approximately 560 feet. Estimated use is high.

Mudjekeewis Trail - #1085: The trail is an interior wilderness trail that is 4.0 miles in length and provides a "most difficult" type of experience for hikers and horses. The trail connects with Tom and Jerry, and McKie Camp trails. Elevation change is approximately 280 feet. Estimated use is moderate.

# I. DATA - Continued

## C. Trails:

### 1. Summer Opportunities - Continued

Jack Springs Trail - #1086: The trail is an interior wilderness trail that is 0.3 miles in length and provides a "more difficult" type of experience for hikers. The trail connects with the Pacific Crest National Scenic Trail. Elevation change is approximately 160 feet. Estimated use is high.

Geyser Springs Trail, Non-Wilderness - #1087: The trail is 1.1 miles in length and provides a "most difficult" type of experience for hikers. A portion of this trail that acted as a wilderness access via the Middle Fork Trail was abandoned because a forest road replaced approximately one mile of the Middle Fork Trail. The trailhead is located on Forest Road 3795-300. Elevation change is approximately 720 feet. Estimated use is low.

Halifax Trail - #1088: The trail is an interior wilderness trail that is 3.0 miles in length and provides a "most difficult" type of experience for hikers and horses. The trail connects with Middle Fork and McKie Camp trails. Elevation change is approximately 1,560 feet. Estimated use is moderate.

McKie Camp Trail - #1089: The trail is an interior wilderness trail that is 5.0 miles in length and provides a "more difficult" type of experience for hikers and horses. The trail connects at both ends with the Pacific Crest National Scenic Trail. Elevation change is approximately 280 feet. However, the lowest point is 600 feet below either end. Estimated use is high.

Red Blanket Trail - #1090: The trail is a primary wilderness access trail that is 3.9 miles in length and provides a "most difficult" type of experience for hikers and horses. The trailhead is located on Forest Road 6205. The trail connects with Stuart Falls Trail. Elevation change is approximately 1,920 feet. Estimated use is high.

Red Blanket Falls Trail - #1090A: The trail is an interior wilderness trail that is 0.2 miles in length and provides a "most difficult" type of experience for hikers. The trail connects with Red Blanket and Lucky Camp trails. Elevation change is approximately 120 feet. Estimated use is high.

Pacific Crest National Scenic Trail - #2000: This trail, commonly called the skyline trail travels from Mexico to Canada. Approximately 26 miles of the PCT are within the analysis area. Estimated use is high.

Big Fir Trail: This non-wilderness trail provides an interpretive opportunity for forest visitors. The trail begins in Imnaha Campground and is 0.2 miles in length. Estimated use is high.

Giant Sugar Pine Trail: This non-wilderness trail provides an interpretive opportunity for forest visitors. The trail begins off of Forest Road 3775 and is 0.5 miles in length. Estimated use is high.

I. **DATA** - **Continued**

A. **Trails - Continued**

2. **Winter Opportunities**

There are no designated winter trail opportunities within the analysis area.

B. **Classified Areas (Wild & Scenic Rivers, Wilderness, etc.):**

There is only one congressionally designated area within the analysis area and that is Sky Lakes Wilderness Area. However, the analysis area does contain one eligible area for potential designation and inclusion into the National Wild and Scenic Rivers System. See specific information below.

Sky Lakes Wilderness Area - The Oregon Wilderness Act, PL 98-328, signed into law on June 26, 1984, established Sky Lakes Wilderness. The Rogue River and Winema National Forests share the administrative responsibility for the area. The total acreage for Sky Lakes Wilderness is 113,413 acres. Elevation ranges between 4,000 and 9,475 feet. Recreation use of the area begins in early to mid-July and lasts into late October (snow-free months). The majority of the recreation use in the summer occurs in the three major lake basins (Seven Lakes, Sky Lakes, and Blue Canyon), and the Mount McLoughlin Trail areas (Sky Lakes basin and Mt. McLoughlin are not within the analysis area). Heavy use in the fall months occurs in the northern part of Sky Lakes during deer and elk hunting seasons. The Sky Lakes area was an original RARE I area (Roadless Area Review and Evaluation) in the early 1970's, and was designated as a Wilderness Study Area (1973), which precluded motorized use and other incompatible activities. Upon completion of RARE II in 1979, the Forest Service recommended Sky Lakes for wilderness designation and was added to the Oregon Wilderness Act.

Wild and Scenic Rivers - In response to an appeal to the Rogue River National Forest's Land and Resource Management Plan (LRMP) from the American Rivers Council, the Forest agreed to conduct Wild and Scenic River eligibility reviews for all waterways on the forest. The one segment of river found potentially eligible within the analysis area is the Middle Fork of the Rogue River. Until an Suitability Study is completed, this river and 1/4 mile on either side is managed as if it is a designated Wild and Scenic River from its origin to the Forest Boundary.

C. **Special Dispersed Features:**

There are 15 recorded dispersed features within the analysis area. To date, very little information is known on their level of use. The table below identifies each dispersed feature and displays the estimated level of use. Use levels are based on the FEIS definitions for dispersed recreation, and an educated guess by a local employee.

| Name | Location | Level of Use |
|---|---|---|
| Black Bear Swamp | T. 34 S., R. 4 E., Sec. 2 | L |
| Giant White Fir | T. 33 S., R. 4 E., Sec. 15 | L |
| Smith Rock | T. 35 S., R. 4 E., Sec. 12 | L |

## I. DATA - Continued

### E. Special Dispersed Features - Continued

| | | |
|---|---|---|
| Giant Sugar Pine | T. 33 S., R. 4 E., Sec. 27 | M |
| Bigfoot Spring | T. 33 S., R. 5 E., Sec. 27 | M |
| Boston Bluff | T. 33 S., R. 5 E., Sec. 27 | M |
| Ranger Spring | T. 33 S., R. 5 E., Sec. 24 | M |
| Jack Spring | T. 32 S., R. 5 E., Sec. 35 | M |
| Blue Rock | T. 35 S., R. 4 E., Sec. 12 | M |
| Rustler Peak | T. 34 S., R. 4 E., Sec. 16 | M |
| Judge Waldo Tree | T. 35 S., R. 5 E., Sec. 21 | M |
| Imnaha Spring | T. 33 S., R. 4 E., Sec. 15 | H |
| Devils Peak | T. 34 S., R. 5 E., Sec. 3 | H |
| Solace Meadow | T. 33 S., R. 5 E., Sec. 3 | H |
| McKie Meadow | T. 32 S., R. 5 E., Sec. 34 | H |

### F. Recreation Special Uses:

Traditionally, there are four authorized special use permits within the analysis area.

Outfitter and Guide - There is an annual Outfitter and Guide (O&G) Permit for the northern end of Sky Lakes Wilderness Area. The permit allows for day trips and extended trips into the wilderness area. The majority of guided trips occur during elk season. This permit allows for 200 use days, but has historically only utilized 20% of those days.

Outfitter and Guide - There is an annual Outfitter and Guide (O&G) Permit for the southern end of Sky Lakes Wilderness Area. The permit allows for day trips and extended trips into the wilderness area. The majority of guided trips occur during deer and elk season. This permit allows for 200 use days, but has historically only utilized 10% of those days.

Outfitter and Guide - There is an annual Outfitter and Guide (O&G) Permit for Blue Canyon of Sky Lakes Wilderness Area. The permit allows for day trips and extended trips into the wilderness area. The majority of guided trips occur during the summer months. This permit allows for 200 use days, but has historically only utilized 30% of those days.

Imnaha Guard Station Rental - The Imnaha Guard Station entered into the rental program during the fall of 1995. The original intent was to utilize it as a winter rental. Due to low rental occupancy, the guard station was added as a summer rental during 1996. The cabin was rented approximately 15 times in 1996, for a total of 25 nights.

## II. RECREATION OBJECTIVES

### A. Forest Management Goals

The Forest's LRMP describes the Management Goals for individual resources. The following Goal statement is for the recreation resources.

Recreation - Offer a wide range of developed and dispersed recreation opportunities by providing recreational settings, access, facilities, and education necessary to meet public demand.

### B. Recreation Opportunity Spectrum Classification:

The topographical and biological variety of the Rogue River National Forest provides a wide range of recreation settings and opportunities. In order to describe and inventory these settings, the Forest Service has developed a classification system called the Recreation Opportunity Spectrum (ROS). ROS combines physical, social, and managerial settings with recreational activities and experiences. The Forest was inventoried in 1981 in accordance with the ROS system. Of the seven classes, the analysis area contains three: Primitive, Semi-Primitive non-motorized, and Roaded Natural. The Primitive (which also has a sub-class called Pristine) and Sem-Primitive Non-Motorized settings lie entirely within the Sky Lakes Wilderness Area, and the Roaded Natural setting is the general National Forest portion of the analysis area outside of the wilderness. Both the setting and experience characterizations for each class are listed below.

**Table 1: Settings**

| PRIMITIVE | | | |
|---|---|---|---|
| **Pristine** | **Primitive** | **Semi-Primitive Non Motorized** | **Roaded Natural** |
| Area is characterized by an extensive, unmodified natural environment. The goal is that natural processes and conditions have not and shall not be measurably affected by people. People are only brief visitors and interaction is minimal. Essentially no facilities are required to protect the wilderness resource. The area is free from evidence of human activities or constructed facilities. Motorized use within the area is not permitted. | Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free of human-induced restrictions and controls. Motorized use within the area is not permitted. | Area is characterized by a predominately natural or natural-appearing environment of moderate-to-large size. Interaction between users is low but there is often evidence of other users. The area is managed in such a way that minimum on-site restrictions and controls may be present, but are subtle. Motorized use within the area is not permitted. | Area is characterized by a predominately natural-appearing environment with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of |

# II. RECREATION OBJECTIVES - Continued

## B. Recreation Opportunity Spectrum Classification - Continued

**Table 2: Experience**

| PRIMITIVE | | | |
|---|---|---|---|
| **Pristine** | **Primitive** | **Semi-Primitive Non Motorized** | **Roaded Natural** |
| Opportunity for isolation and solitude is assured. The outstanding opportunities for cross-country travel offer a high degree of challenge and risk. Fully experiencing the area requires proficiency with primitive recreation skills. | Extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers a high degree of challenge and risk. | High, but not extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers a high degree of challenge and risk. | About equal probability to experience affiliation with other user groups and for isolation from sights and sound of humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible. |

## B. Desired Future Condition:

This section describes the desired future condition (DFC) of the resources within the Rogue River National Forest if the management direction from the LRMP is implemented. This DFC describes, in general terms, the conditions that will exist on the Forest in ten and fifty years from 1990. No site specific DFC's have been developed for the recreation resources within the analysis area. **Note:** It is important to recognize that these DFC's reflect a judgment of the potential condition, not necessarily the "desired" conditions, and in fact, some portions of these DFC's are already obsolete because of changing environmental laws.

<u>The Forest in Ten Years:</u> Opportunities for roaded recreation will increase. Developed recreation capacity will keep pace with demand as new sites are developed and others are expanded. Opportunities for unroaded recreation will be provided in three wildernesses and five roadless areas. The total acres available for unroaded recreation will continue to decrease, however, as timber harvest activities occur in some areas. Ease of access to Wilderness portals will increase. Although there should not be overcrowded conditions, some sites may be used to such an extent that management of primitive ROS standards will be difficult.

<u>The Forest in Fifty Years:</u> An essentially completed road system will ensure easy vehicle access to much of the forest. Developed recreation capacity will keep pace with demand with some additional site expansion and development. Unroaded and Semi-Primitive Motorized recreation opportunities will continue to decrease although much of the development of roadless areas will have occurred in the first decade. Although there will not be overcrowded conditions, some sites in Wilderness may be used to such an extent that management to primitive ROS standards will be difficult. Permits, or other direct regulatory controls may be necessary to ensure Wilderness objectives are met.

## Literature Cited/Reference Sources


Rogue River National Forest Land and Resource Management Plan, 1990.

Rogue River National Forest Final Environmental Impact Statement, 1990.

USDA - Forest Service ROS Book, 1986.

Forest Service Manual 2300 Recreation, Wilderness, and Related Resource Management, Ongoing.

Rogue River National Forest Access and Travel Management (A&M) Assessment, 1997.

USDA - Forest Service GT Report INT171, Wilderness Fire Management Planning Guide, 1984.

RRNF Land and Resource Management Plan, Appendix E, Sky Lakes Wilderness Implementation Plan.